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FOREWORD

The *United States Armed Forces Medical Journal* is the medium for disseminating information of administrative and professional interest to all medical personnel of the Department of Defense. The Assistant Secretary of Defense (Health and Medical) and the Surgeons General of the several services invite all medical officers, dental officers, Medical Service Corps officers, Nurse Corps officers, and officers of the Veterinary Corps of the Armed Forces, and the medical consultants of the Army, Navy, and Air Force to submit manuscripts for publication in this *Journal.*

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Monthly Message

This is an advance welcome to the Association of Military Surgeons who will meet with us here in Washington at the end of the month. This Association holds the unique distinction of being semiofficial in nature in view of the fact that it was established by Congress many years ago to promote better relationships between the military and civilian arms of the medical profession and a better understanding of military medicine by nonmilitary persons. These days when there are so many national, state, local, and social medical organizations from the American Medical Association down to the smallest group of ten or a dozen doctors gathered for a pleasant evening together, it is difficult to choose which to attend. The Association of Military Surgeons has an unusually good program this year with much of interest for all doctors who have an interest in the maintenance of strong military departments. This office sincerely hopes that there will be a generous attendance at the meetings and wishes to take this opportunity to afford the Association a most hearty welcome to the city. We appreciate your presence here and trust that you will find your stay both enjoyable and profitable.

Frank B. Berry

FRANK B. BERRY, M. D.
Assistant Secretary of Defense
(Health and Medical)

AN OBJECTIVE TEST FOR ASTHMA

JACQUES L. SHERMAN, Jr., *Major, MC, USA*

THE need for some objective procedure in the diagnosis of bronchial asthma has been obvious for many years. Because the patient is often without symptoms and the characteristic signs, the diagnosis must frequently rest for some time on the history and exclusion of other conditions. Based upon certain fundamental studies, a simplified test has been developed[1] which can be of aid to the clinician in establishing the diagnosis of bronchial asthma.

EXPERIMENTAL AND PHYSIOLOGIC BASIS

Many incidental observations have been made during pharmacologic and physiologic studies indicating that certain drugs could produce asthmalike attacks in patients known to have bronchial asthma. In studies on the effects of histamine on the cardiovascular system, Weiss and associates[2] observed that in patients subject to bronchial asthma attacks were often precipitated by administration of small amounts of this drug. Later investigations led to the conclusion that histamine had no measurable effect on the respiratory system of normal persons, and that patients with asthma do not react with increased sensitivity but with altered response (idiosyncracy) to histamine.[3]

Similarly, Alexander and Paddock[4] had observed and then investigated the effect of pilocarpine in asthmatic subjects. They showed that asthmalike attacks could be induced in susceptible persons by subcutaneous injection of small amounts of pilocarpine. Subsequent reports have demonstrated the effectiveness of small doses of other parasympathomimetic agents such as methacholine chloride (acetyl-beta-methylcholine chloride),[5] carbachol (carbaminoylcholine chloride),[6] and acetylcholine chloride.[7] Villaret and others[8] were able to provoke attacks in persons subject to asthma at will, and to end these attacks with atropine. All of these observers noted the fact that such "asthmalike" attacks could be produced only in susceptible subjects, and that these drugs had little or no effect on the respiratory function of normal persons. Hurtado and Kaltreider,[9] however, demonstrated some reduction in vital capacity in two normal

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subjects by using larger doses (15 and 30 mg.) of methacholine chloride.

On the basis of these and other reports, Curry[10,11] and Curry and associates[12] made careful, quantitative observations on the effects of histamine and methacholine chloride in normal persons, in persons with other allergic diseases, and in persons with bronchial asthma. They demonstrated that these drugs would produce significant changes in the resting vital capacity, maximum breathing capacity, and rate of maximal expiration in subjects with bronchial asthma. Analysis of results showed that age, sex, or the presence of hay fever, eczema, or urticaria in the patient or of history of these conditions in the patient's family appeared to have no influence on the subject's susceptibility to the two drugs. In addition, a general relationship between the severity of the asthma and the response to the drugs was seen.

TEST PROCEDURE

Patients were tested under the following conditions adopted from Curry:[10] Tests were conducted at least two hours after a meal, when the subject had rested 20 minutes, and had had no medication for 12 hours prior to the test, unless the effects of specific drugs were being evaluated. The nature of the test was explained to assure co-operation, but the expected results were not indicated in any way.

In order to avoid variations in absorption, test drugs were given rapidly by vein. Histamine phosphate was given in a dosage of .03 mg. of histamine base. Methacholine chloride 1:1000 solution was prepared in sterile distilled water. If refrigerated, this preparation retains its potency for about one month. The standard test dose was 0.5 mg., given as 0.5 cc. of the prepared solution.

Serial determinations of vital capacity were made 30 seconds after injection, one minute after injection, and at one-minute intervals until the patient's vital capacity had returned to or near the baseline. In addition to measuring vital capacity, the examiner listened to the patient's chest during the procedure to detect the presence of changes in physical signs which may give additional information. At the conclusion of each test, the patient was questioned as to any subjective changes—substernal compression, dyspnea, wheezing, et cetera. Usually the patient was unaware of any pulmonary symptoms during or after the test.

Control tests may be done by using physiologic saline in place of the other test drugs. If the patient is not informed of the substitution and if the test procedure is not modified in any other way, the examiner can satisfy himself that psychic factors do not influence the vital capacity. When this was done in this

series, only one patient showed any significant variation; this was an increase of 20 percent in the recorded vital capacity. The subject reported that "the drug made me feel nervous inside."

PRECAUTIONS, SIDE EFFECTS, REACTIONS

Before any testing is done, the patient's current physical status must be determined. The presence of any cardiac arrhythmia, marked hypertension, or an asthmatic attack must be considered contraindications to testing. Due to the well-known effects of histamine on the circulation, the patient may be expected to develop at least an intense flush over the face, and a headache. The headache may be transient, or persistent enough to require treatment, but it does not interfere with the performance of the test if the patient has been forewarned. No significant change in blood pressure should be expected, unless the patient should happen to have a pheochromocytoma.

No important side effects have been observed following the administration of the test dose of methacholine chloride.

In Curry and Lowell's[12] experience and in my own, few reactions have occurred. In two of my patients given methacholine chloride, almost complete apnea developed, but normal respirations returned within 30 to 40 seconds in both patients. In one patient being tested with histamine, a shocklike state developed which disappeared within two minutes following suitable treatment. After receiving methacholine chloride, one other patient developed a supraventricular tachycardia, which spontaneously reverted to normal rhythm in 40 minutes. Because of the possibility of such reactions, a syringe loaded with epinephrine should be kept on hand.

METHOD AND RESULTS

In this series, tests were recorded where possible on a waterless basal metabolism apparatus in order to obtain a permanent record, but any standard method of obtaining vital capacity is satisfactory.

The results of tests were obtained in a group of 50 patients. Their age range was from 17 to 69 years; all but two were men. Responses to the tests were graded as shown in table 1, and the over-all results by class of patients are given in table 2. Patients listed as showing a positive response were those whose vital capacity was reduced 11 percent or more by histamine, methacholine chloride, or both.

Control Group. Nine subjects were selected for testing in whom there was no history or evidence of respiratory disease. Two of

them showed a positive response. One had a 12 percent reduction of vital capacity following injection of histamine. It was of interest that a more careful check of his history after the test, revealed that for four years prior to the testing the subject had had occasional episodes of wheezing when "exposed to damp climate plus physical exertion." The other, a medical officer, had a fall in vital capacity after a test dose of methacholine chloride. In this case no additional history could be obtained.

TABLE 1. *Grading of responses*

Change of vital capacity (percent)	Grade	Response
Any increase, or 0 to −10	0	None
−11 to −20	+	Moderate
−21 to −39	++	Marked
−40 or more	+++	Very marked

Patients With Other Respiratory Diseases. In this group of 11 patients, four showed a positive response; two to histamine, one to methacholine chloride, and one to both drugs. Ten patients were diagnosed as having "chronic bronchitis with bronchospasm," and one had the diagnosis of "rhinitis, vasomotor perennial." These diagnoses were made by the responsible ward officers and agreed with those from the hospital's allergy clinic.

TABLE 2. *Summary of test results*

Subjects	Number	Positive	Negative
Controls	9	2	7
Patients with other respiratory diseases	11	4	7
Patients with bronchial asthma	30	30	0

Patients With Asthma. Positive responses were obtained in all 30 patients in whom this diagnosis had been made and established on clinical grounds. Of these, seven gave positive responses to histamine, eight to methacholine chloride, and 15 to both drugs.

ILLUSTRATIVE TEST RESULTS

Case 1, Control Group. This 33-year-old medical officer gave no history of respiratory tract disease. During and after the test, no subjective sensations related to the chest were reported.

Test number	Date	Drug	Initial vital capacity (cc.)	Percent of change
1	23 Feb. 1950	Histamine	4890	−3
2	27 July 1950	Methacholine chloride	4500	−5

Case 2, Asthma Group. This 32-year-old soldier had one attack of wheezing in June 1948. There were frequent attacks in May 1950. Physical examination at the time of testing was completely normal, and no symptoms were reported during the tests. This man proved to be sensitive to methacholine chloride and not to histamine.

Test number	Date	Drug	Initial vital capacity (cc.)	Percent of change
1	6 Nov. 1950	Histamine	5205	−2
2	6 Nov. 1950	Methacholine chloride	5900	−32
3	6 Nov. 1950	Methacholine chloride	5600	−37

Case 3, Asthma Group. Both parents of this 32-year-old soldier had asthma. The onset of his attacks occurred one year prior to testing. Physical examination revealed frequent rales and expiratory wheezes.

Test number	Date	Drug	Initial vital capacity (cc.)	Percent of change
1	7 Feb. 1951	Methacholine chloride	4022	−40
2	8 Feb. 1951	Saline	3650	−1
3	9 Feb. 1951	Histamine	3786	−44
4	20 Feb. 1951	Methacholine chloride	3921	−43
5	24 Feb. 1951	Methacholine chloride	3887	−44
6	27 Feb. 1951	Water	4157	−8
7	28 Feb. 1951	Methacholine chloride	3853	−41

This patient reported "wheezing" following injection of histamine (test 3), but no change in physical signs was detected by the examiner during the procedure. The reproducibility of the test response is well demonstrated here. Not all patients showed such similarity of response on repeated tests, but only rarely were the results of successive tests significantly different. There was also a lack of important response to the injection of inactive substances.

PROTECTION STUDIES

Although the purpose of this article is to present a diagnostic aid, the principle of protection should be mentioned as it may serve in interpretation of results. According to the testing procedure, before the test is repeated, anticholinergic agents are given to those patients whose primary sensitivity is to methacholine chloride. The belladonna alkaloids, aminophylline, epinephrine, and methoxyphenamine hydrochloride (orthoxine hydrochloride) gave significant protection against the reduction of vital capacity due to injected methacholine chloride.[13] Oral antihistaminic agents have afforded similar protection to patients who are sensitive to histamine. Satisfactory protection consists of reducing the fall in vital capacity by 50 percent or more. For example, on 12 February 1951 a histamine test was performed on the patient cited in test case 3 two days after he had been placed on an oral antihistaminic, and he demonstrated a fall of only 14 percent in vital capacity as compared to a 44 percent reduction without this protection. Similarly, he showed a reduction of vital capacity of 10 percent when 0.65 mg. of scopolamine had been given sublingually 50 minutes before retesting with methacholine chloride.

In a small series of patients, clinical protection has been accomplished by the use of either antihistaminic or anticholinergic drugs, selected according to the results of testing. It is obvious that because epinephrine is both an antihistaminic and an anticholinergic agent, it will provide relief or protection for a patient no matter what his mechanism of response. Further studies along this line are definitely indicated.

DISCUSSION

The results in this series of 50 patients show that, while all asthmatic patients gave a positive response to the test, six in the group of nonasthmatics also gave this response.

Thus it is clear that, while a positive response does not establish the diagnosis of asthma, a negative response would help to rule this out. This procedure, like almost all others in medicine, must be evaluated as a part of the entire examination. I

believe, however, that at present it represents an important diagnostic aid available to the physician, because skin-testing is a nonspecific procedure related more to diathesis than to disease entity.

Use of such a procedure may be of benefit in the screening of persons who present themselves at an induction center with a history suggestive of asthma. In such persons, definite, positive tests might warrant further observation before induction, because the military value of a chronic asthmatic is limited.

On the other hand, negative results would aid the examiner in his evaluation of the person's fitness for military service. Similarly, such screening might prove helpful in evaluating applicants for service academies or for other special training. In smaller military hospitals where the question of disposition to the front or to the rear depends on definitive diagnosis, such a test may be practical.

The pathophysiologic implications of the test are of great interest. Because certain asthmatic patients will have a reduction of pulmonary function following injection of histamine while others will respond only to methacholine chloride, it follows that in asthma at least two abnormal pathways must exist for the production of the attack. The possibility of a third mechanism is suggested by the reduction of vital capacity in asthmatics following inhalation of aerosolized pollen extracts.[14,15] It seems more likely, however, that contact of these pollens with bronchial mucosa sets up either a "cholinergic" or a "histaminic" mechanism, because no patient with asthma studied by this technic has failed to respond to the introduction of either methacholine chloride or histamine. Certainly, further elucidation of these pathways or mechanisms will be productive in increasing our knowledge of the pathogenesis of asthma. For example, a form of surgical treatment for intractable asthma consists of destruction of the parasympathetic (cholinergic) nerve supply to the lung and bronchi, usually on the left side, but sometimes bilaterally. One published series[16] indicated good results in 22 of 38 patients so treated. It may be pertinent to suggest that better results might follow selection of patients for parasympathetic denervation from among those whose primary sensitivity was to a parasympathomimetic drug, rather than from a group whose test results indicated histamine sensitivity.

SUMMARY

A simple clinical test here described can aid in the diagnosis of bronchial asthma. All members of a group of 30 patients with clinically diagnosed asthma showed positive tests. Among 20 nonasthmatic subjects, six positive tests were recorded. This

procedure might be particularly valuable to the military service at induction centers when screening persons with histories suggestive of asthma, or in smaller military hospitals where the problem of evaluation of asthma is difficult.

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A MISSING LINK IN THE HISTORY OF HISTOPLASMOSIS IN PANAMA

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HISTOPLASMOSIS was first described from Panama by Darling[1] in 1906. During an 8-month period between December 1905 and August 1906 he encountered three cases at autopsy at the Board of Health Laboratory, Ancon, C. Z. His studies on the lesions and the causative parasite led to further publications[2,3] in 1908 and 1909. Histoplasma infection was not again described from Panama until 1945 when Tomlinson and Grocott[4] reported a canine infection. More recently extensive studies of skin sensitivity to histoplasmin, tuberculin, and coccidioidin have been made by Tucker[5-7] on "non-white" patients admitted to the Colon Hospital, Cristobal, C. Z. Nearly two-fifths of the patients tested had positive reactions to histoplasmin. Whereas only 1.7 percent of 230 children in their first decade were histoplasmin-positive, there was an abrupt rise to 35 percent positivity during the second decade, and to a plateau of about 55 percent positivity during the next four decades. Of 77 patients who were histoplasmin-positive but tuberculin-negative, 15.6 percent had one or more foci of pulmonary calcification. A slightly greater incidence of pulmonary calcification was noted on roentgenograms of patients who reacted positively to both histoplasmin and tuberculin. In spite of these indications of rather widespread contact with *Histoplasma capsulatum,* none of these patients showed any mycologic, serologic, or pathologic evidence of active histoplasmosis.

Shortly after Tucker's studies were completed, a 4-month-old Negro infant died at Gorgas Hospital of disseminated histoplasmosis.[8] Organisms were identified in the lung, liver, spleen, and lymph nodes. This case, then, represented the first human infection by *H. capsulatum* to be recognized in Panama since Darling's original cases 45 years earlier. Since the publication of Draheim's case there have been two additional deaths from histoplasmosis in Panama. Although neither has as yet been reported in the literature, one (AFIP Acc. 584154) has been reviewed and the diagnosis confirmed at the Armed Forces Institute of Pathology.

From Armed Forces Institute of Pathology, Washington, D. C.

These recent cases did little to solve the enigma of a disease considered extremely rare by clinicians and pathologists in Panama, but actually very prevalent in that area when judged by skin sensitivity tests. Moreover, the recent cases served to accentuate the mysterious disappearance of the disease for so many years. Tucker speculated that because superficial fungus infections are common in Panama, the high incidence of histoplasmin reactors might be attributable to nonspecific or cross reactions. Further evidence that the epidemiologic situation in Panama might not be entirely analagous to that reported from the United States was the lack of any doubtful or positive histoplasmin reactors among 691 cattle even when the concentration of antigen was increased to 1:5.[9] Furcolow and Ruhe[10] in Kansas, had found a high incidence of histoplasmin-positive cattle and therefore deduced that "both cattle and men are probably infected from the same outside source."

Although the true state of affairs regarding histoplasmosis in Panama must await further developments, the suspicion that contact with the causative fungus is and has been rather widespread in Panama is given further support by two recent discoveries.

The first evidence comes from Fitzsimons Army Hospital in Denver, Colo. Puckett and his colleagues at that hospital have found organisms morphologically compatible with *H. capsulatum* in about 40 pulmonary lesions following surgical resection.[11] The first 30 have been reported recently.[12,13] Of especial interest is the fact that 13 of these 30 patients had resided in Panama for periods of from two to five years before their pulmonary lesions were discovered. In at least four of these cases there was roentgenologic evidence that the lesion had developed while the patient resided in Panama. Puckett's cases have been filed at the Armed Forces Institute of Pathology.

The second evidence and the primary reason for this article was the accidental discovery of a single healing pulmonary granuloma due to histoplasma, entirely similar to those in Puckett's series, in a Panamanian child who had died in 1931. This case had been included inadvertently in a group selected from the files of the Armed Forces Institute of Pathology for another study. The autopsy had been performed on 27 June 1931 at Colon Hospital. This 4-year-old, native-born child was admitted to the hospital with a fever of 105° F., in a delirious, semicomatose state, and died 26 hours later. Malarial parasites were found in his blood smears before death, and in smears prepared from the 220-gram spleen and the bone marrow at autopsy.

Microscopic study of the organs revealed no evidence of disseminated histoplasmosis. One section of lung contained a single

discrete pulmonary granuloma, 0.7 cm. in diameter. This lesion had the typical appearance of a "tuberculoma" with no active inflammatory reaction (fig. 1). Because this lesion came to my attention at about the same time I was reviewing Puckett's cases, the striking similarity was noted and special fungus stains were

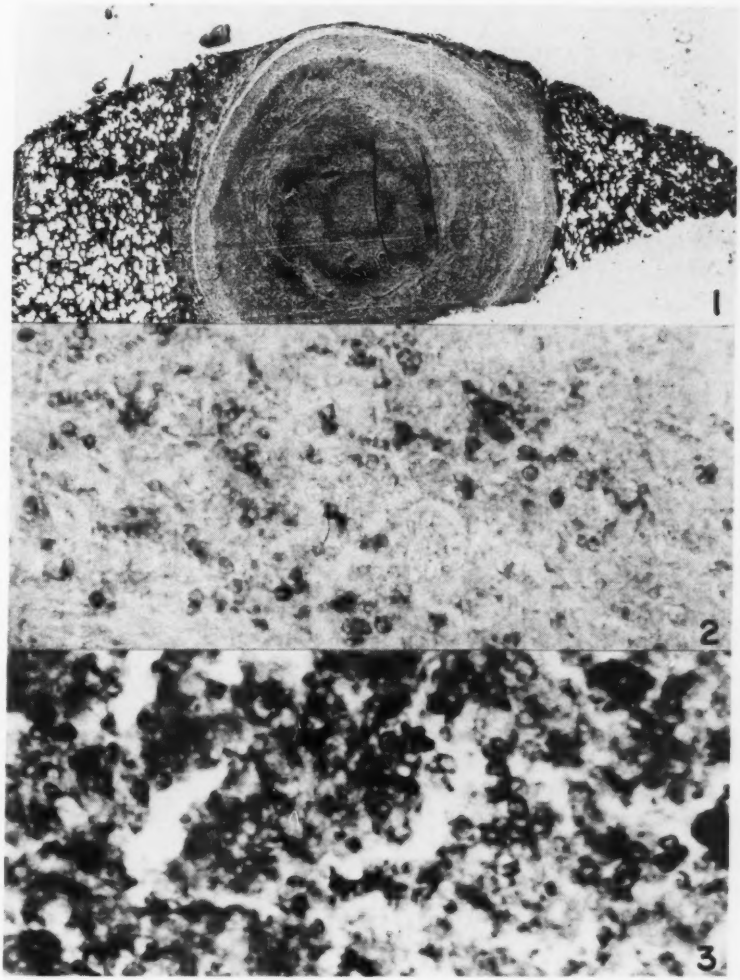

Figure 1. Discrete, well-encapsulated granuloma of lung. (Hematoxylin and eosin stain, × 11½.) Figure 2. Histoplasma within the central necrotic area of the granuloma shown in fig. 1. (Gridley fungus stain, oil immersion, × 990.) Figure 3. Another field from the same lesion showing histoplasma. (Gridley fungus stain, oil immersion, × 1210.)

prepared.[14] The reward was the finding of a central focus heavily laden with bodies having the same size, shape, and staining reactions as those in Puckett's series (figs. 2 and 3). This lesion was shown in consultation to Doctors C. H. Binford* and C. W. Emmons,** who agreed with the diagnosis of localized pulmonary histoplasmosis. Lesions of this sort may be responsible in part for the occurrence of pulmonary calcification in tuberculin-negative, histoplasmin-positive persons.

This case partially fills the long gap from 1906 to 1945 when no new cases of histoplasmosis were reported from Panama. Together with the epidemiologic studies of Tucker and the pathologic reports from Forsee, Puckett, and Hagman's surgical patients who had been exposed in Panama where their lesions were discovered, the case herein reported suggests that histoplasmosis has been and still is prevalent in Panama.

SUMMARY

The recent demonstration of histoplasma by use of special fungus stains in a pulmonary granuloma of a native Panamanian child who died at Colon Hospital in 1931 provides a missing link in the history of histoplasmosis in Panama. This disease had not been reported in that country for almost 40 years following Darling's original description of the organism.

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PREVENTION OF "COMBAT FATIGUE" IN CIVILIANS

There is one aspect of combat fatigue, familiar from World War II, that has important implications for civil defense. Combat fatigue was not entirely a problem within a given person, as was shown by the relative incidence of casualties in different units subject to comparable stress. It was repeatedly found that certain units within a battalion, regiment, or division ran consistently higher or lower casualty rates than their neighboring units. As the distribution of vulnerable persons was similar in all organizations, the disproportinate incidence of psychiatric breakdown could not be attributed to disparities in that respect. The only tenable explanation was that the difference was owing to the influence of the group or combat unit which could offer realistic protection against external fear. The soldier did not fight alone. He had his buddies by him who shared his dangers and privations, and whom he knew would help him if he were disabled. The more confidence he had in his platoon or company the less fearful was the battle situation. But in civilian population this sort of support is more difficult to achieve. To bring it about, people must be organized into close units and trained to meet disaster. Unless a close working together of the smallest units in a community is fostered, the feeling of helpless isolation and inability to cope with the situation will add to the already heavy emotional burden all must bear. This in turn will increase the incidence of mental breakdown.

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IODINE METABOLISM AND ITS RELATION TO THE THYROID HORMONE

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BECAUSE thyroid function is so intimately associated with iodine metabolism, our understanding of thyroid diseases presupposes knowledge of the physiology of iodine.

We know now, of course, that a deficiency of iodine results in the development of simple colloid goiter. In ancient times, however, ashes of seawood and sponge were used in treatment of goiter. Coindet[1] first used iodine itself therapeutically, after the element was discovered in 1812 incident to a search for gunpowder for Napoleon's armies, and Chatin[2] in the mid-nineteenth century scientifically correlated iodine-deficient geographic areas with the incidence of goiter. In this country Marine[3] first established the value of iodine in goiter prevention in his classic studies on the school children of Akron, Ohio. Since then the addition of iodine to food (usually as 1:10,000 of table salt), has reduced greatly the incidence of goiter in endemic districts.

IODINE DEFICIENCY

Iodine deficiency may result from an absolute lack of the mineral in ingested food and water or from a relative insufficiency during periods of increased metabolic demand, such as puberty, pregnancy, and lactation. In addition, it seems probable that certain microorganisms in the digestive tract may reduce the iodine absorption from food, as was demonstrated by McCarrison and Madhava,[4] who correlated the incidence of goiter with that of infected drinking water in India. It is well known, moreover, that certain compounds, notably the thiocyanates, inhibit iodine uptake in the thyroid gland. Presumably one or more of these substances is the active factor in foods such as raw cabbage, turnip, kohlrabi, and rutabaga which enhance the goitrogenic effect of an iodine-deficient diet. These vegetables are known to be high in cyanogen content, which presumably converts to cyanides and cyanates.[5]

The goitrogens (sulfonamides, thiourea derivatives, and certain leafy vegetables) conceivably may be responsible for colloid goiter in regions outside of the goiter belt. For instance, in

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Derbyshire, England, endemic goiter may be due to dietary factors because the water in that region contains an adequate amount of iodine and the introduction of iodized salt did not reduce the goiter incidence.[6]

Wyngaarden and associates[7] reported that iodide collection by the thyroid gland is inhibited not only by the thiocyanate ion but also by perchlorate, chlorate, hypochlorite, periodate, iodate, biiodate, and nitrate. In fact, perchlorates were 10 times as potent as thiocyanates in discharging iodides already accumulated in the thyroid gland.

IODINE UTILIZATION

The thyroid gland has a remarkable avidity for iodine. Although thyroid tissue usually constitutes only 0.05 percent of the body weight, it contains about 20 percent of the total iodine, the rest being found mainly in the skeletal muscles, pituitary gland, and ovaries. The thyroid gland concentrates iodine to about 250 times the level in blood plasma and 80 times that of any other organ. Gastric juice concentrates iodine to levels 40 times and salivary juice to levels 30 times those of plasma, but their concentrations parallel those of the plasma while those of the thyroid gland continue to rise even when the blood levels fall. This gastric and salivary concentration is of embryological interest because the thyroid gland also originates from the foregut.

Eighteen percent of the iodine fed experimental animals can be recovered in the thyroid gland; and when radioiodine is administered, the unsaturated gland becomes saturated with inorganic iodide in five to 10 minutes. The daily iodine requirement of man is about 100 μg. but actually more than twice that amount is used because the thyroid gland constantly prepares fresh hormone for future use. The average normal human thyroid contains a total of from 10 to 15 mg. of iodine, which represents about 2 mg. per gram of dried tissue. This compares with the normal blood iodine concentration of from 4.0 to 7.5 μg. per 100 cc. of serum, which totals less than 1 mg. for the entire circulation.[8] The thyroid gland is able to "trap" sufficient iodine from this minute blood concentration by virtue of its blood flow of 4 ml. per gram of tissue per minute, which is richer than any tissue other than lung, and it is estimated that it can extract from about 27 liters of blood daily.[9] The mechanism of iodine concentration or trapping may not be entirely by simple diffusion but rather by adsorption on protein.[10]

Three new developments have increased our knowledge of iodine metabolism: (1) metabolic studies with the radioactive isotopes of iodine; (2) accurate methods for separation, identification, and chemical determination of iodine-containing com-

pounds in biologicals (such as the Chaney method, which permits determination of as little as 0.005 μg. of iodine in analysis specimens as small as 1 or 2 ml. of plasma or serum); and (3) pharmacological agents which allow biologic dissection of thyroid function in living subjects by interfering with specific steps in thyroid hormone manufacture.

Radioiodine (I^{131}) is an excellent tracer substance with its convenient half-life of eight days and its near-freedom from inert iodine, which makes possible its oral or intravenous administration without an appreciable increase in the total iodine content of the body. However, for physiologic study, the usual therapeutic doses cannot be used because the decreased thyroid activity upsets the equilibrium under study, and thyroglobulin may be liberated abnormally from the gland, causing an elevation of the serum iodine levels. For these reasons, and also to avoid any possible carcinogenic effect by radioiodine, doses of less than 100 microcuries are advocated for physiologic studies. Fortunately, sensitive recorders such as the scintillation counter permit accurate measurements after small tracer doses. For the actual amounts of iodine being metabolized, chemical methods must be used. A fairly clear picture of the metabolic steps is obtained from the combination of these technics.

Regardless of the form in which iodine is ingested, it is absorbed as inorganic iodide, partly in the stomach but mostly in the intestine. It was demonstrated by Leblond and Stie[11] that injection of iodate, diiodotyrosine, or thyroxin is followed by no iodine uptake for some time, until those forms are broken down to iodides. Albert and Keating[12] showed that in tracing I^{131} after its absorption through the gastrointestinal tract, there is radioactivity over the liver for a period of several hours, presumably due to the presence of radioiodine in the bile and hepatic lymph. When I^{131} is given intravenously radioactivity concentration does not occur over the liver. They[13] also gave radioactive diiodotyrosine to myxedematous human volunteers and found that it was practically all converted to iodide and rapidly excreted in the urine. Albert[14] administered radiothyroxin and found that I^{131} accumulated in the thyroid gland at a slow constant rate independent of the plasma concentration, indicating that the thyroid I^{131} must have come from the radioiodide liberated by catabolism of thyroxin rather than that administered. Wallace and Brodie[15] in 1937 showed that administered iodides behaved exactly like chlorides and thiocyanates, being found almost entirely in the extracellular fluids throughout the body, except for the chloride concentration in the brain and the iodide in the thyroid gland. They concluded that any selective chemical or physical relationship of iodide to tissue cells was improbable.

The ion is excluded from most cells but freely traverses the erythrocyte membrane, reaching a concentration in the red cell fluid about two thirds that of the plasma. Iodide also can be found in cerebrospinal, ascitic, and edema fluids. It traverses the placenta to be stored in the fetal thyroid gland; and is secreted in the milk during lactation. Very small amounts of iodide are lost in the sweat, feces, and possibly expired air. In euthyroid persons this loss probably totals less than 6 μg. daily.[16]

RENAL EXCRETION

Most of the iodide is either trapped in the thyroid gland or excreted by the kidney. Some of the administered iodide passes into the stomach and small intestine but most of this is reabsorbed, so that little is excreted by the colon. In the kidney, iodide is filtered through the glomeruli and then about three fourths of it is reabsorbed by the tubules. Because of this renal competition with the thyroid for iodine, renal impairment theoretically should lessen the chance of iodine deficiency and goiter. Based on radioiodine studies by Myant and associates,[17] the thyroid and renal removal of I^{131} differs from that of other tissues because both clear a constant volume of plasma of radioiodine each minute and their rates of uptake or excretion vary with the plasma levels, whereas the loss to the tissue decreases as equilibrium is approached. The renal clearance of iodine normally does not change, and this constancy of excretion results in a negative iodine balance when the intake is insufficient for metabolic demands. The renal clearance of administered I^{131} has been computed to be about 32 ml. per minute in both euthyroid and hyperthyroid patients, which, allowing for the amount contained in the red blood cells, totals about 37 ml. of blood per minute. Because the renal blood flow averages 1,200 ml. of blood per minute, this amounts to about a three percent efficiency of removal. The clearance is depressed in renal disease, myxedema, and after experimental hypophysectomy.[16]

The average iodine uptake by the normal thyroid gland has been calculated to average 10 μg. per hour when I^{131} is given.[18] When small amounts of iodides are added, the total iodine uptake increases, but larger amounts inhibit its organic binding in the thyroid gland. When not bound, the iodine continues to circulate in the blood in its inorganic form, which can be excreted by the kidney. This has been suggested by Wolff and Chaikoff[19] as an explanation of why there is occasional exacerbation of the hyperthyroid state of patients receiving iodide therapy, because an insufficiently high blood level will no longer inhibit the gland activity.

Once iodides are trapped and concentrated in the thyroid gland, enzymatic action rapidly combines them with a protein to form

the thyroid hormone. First the iodides are oxidized to iodine. This takes place within a protein molecule and is the step which is blocked by the thiouracil and thiourea compounds, sulfonamides, para-aminosalicylic acid, and para-aminobenzoic acid. Then the amino acid, tyrosine, is progressively combined with iodine to form monoiodotyrosine and diiodotyrosine. Two molecules of diiodotyrosine then couple by oxidation, forming thyroxin in the cells lining the follicles. Thyroxin does not remain free but combines with available proteins to form thyroglobulin and this substance is stored in the colloid. This is the storage form of the hormone and is never found normally in the circulation.

When the active hormone is required, the tightly bound thyroglobulin is hydrolyzed to the smaller thyroxin molecule and released to the circulation by simple diffusion, in a form loosely bound to the serum albumin, alpha globulin, and beta globulin[20] (the concentration gradient of thyroid gland to plasma being about 100 to 1). Thus, iodine is present in the blood stream only as inorganic iodide, thyroxin, and diiodotyrosine in small amounts. In comparison, the thyroid gland iodine is in protein-bound form as, perhaps, 60 percent diiodotyrosine, 15 to 20 percent monoiodotyrosine, and lesser amounts of iodide, monoiodohistidine, and elemental iodine, these ratios changing somewhat with iodine administration.[14, 21, 22]

TRIIODOTHYRONINE

Much experimental work now concerns the evaluation of triiodothyronine, a substance which apparently lies between tyrosine and thyroxin, and in its levo form causes a sharp rise in metabolic activity of laboratory animals. It may represent an intermediate step in thyroxin production or possibly the end-product of thyroxin breakdown in tissue metabolism. Some authorities even conjecture that triiodothyronine may be released into the circulation in thyrotoxicosis, causing a true qualitative abnormality of thyroid hormone activity. Asper and associates[23] reported that preliminary studies on three patients with myxedema showed that l-triiodothyronine produces an immediate metabolic effect five to 10 times that of equivalent amounts of l-thyroxin. They conclude that it may represent the functional constituent of the thyroid hormone.

The reason blood serum and other proteins are not iodinated is due to the fact that iodide must be oxidized to elemental iodine before it is available for iodination of tyrosine, and only the thyroid gland can effect this oxidation. Thus, no amount of iodine given to a thyroidless person will result in thyroid hormone production but any indifferent protein can be iodinated artificially in vitro and this will relieve his deficiency. It is of interest,

however, that when iodides are given to patients with myxedema, a rise occurs in the protein-bound iodine in the serum, presumably from a noncalorigenic organic compound of iodine which is not formed in the thyroid gland.[16]

Albert and Keating's[12] conclusions from radioactive thyroxin administration were that the dietary iodine is by far the greater source in thyroid hormone synthesis. It has been demonstrated that thyroxin itself is not reaccumulated and re-used by the thyroid gland, and only about 20 percent of the iodine freed from catabolism of tissue thyroxin is trapped by the thyroid gland, the bulk of it being excreted in the urine as iodide and small amounts as thyroxin and possibly diiodotyrosine. In addition, certain amounts of the hormone are excreted in the feces in the protein-bound form. Thus, the economy of iodine conservation from the thyroid hormone is poor, and continued formation in the gland is necessary for normal metabolism.

EFFECTS OF THYROID HORMONE

The active thyroid hormone circulates in its protein-bound form in the blood plasma and has the function of a catalyst to increase the oxidative processes of body tissue, probably by direct action on the cells. A single administered dose will result in a rise in the basal metabolic rate in a few hours, reaching a maximum effect in a few days and lasting several weeks. The average human being possesses a total of about 14 mg. of thyroxin at a given time, and it is estimated that about 0.3 mg. is manufactured and delivered daily. One milligram of thyroxin results in a rise of about 2.5 percent in the human metabolic rate.

The metabolic effects of the thyroid hormone are widespread and vital. As a result of the calorigenic effect, cellular oxygen consumption is increased, with the interesting exceptions of cancer tissue and the thyroid cells themselves. Vitamin utilization and requirements are generally increased from thyroid activity; vitamin A deficiency may occur in hyperthyroidism from increased utilization and also in hypothyroidism from ineffective conversion from carotene. The thyroid hormone also enhances protein catabolism, and myxedema is characterized by the accumulation of extracellular fluid rich in hyaluronic acid, containing a mucoprotein. Creatine excretion increases with thyroid activity, presumably because the hormone is essential for muscle cells to synthesize creatine phosphate from creatine. The thyroid hormone increases the absorption of carbohydrates and enhances the processes of both glycogenolysis and gluconeogenesis. In lipid metabolism, serum cholesterol levels rise with hypothyroidism and fall with hyperthyroidism, the esters remaining in unchanged ratio; because the total body cholesterol and the amount

excreted both remain unchanged, probably this represents merely shift to and from the blood stream. Both diuresis and excessive calcium ion excretion occur in response to the thyroid hormone. Its many other effects include growth stimulation, increased nerve irritability and mental development, and improved, cardiac function.[6] It has also been reported[24] that the ratio of bound magnesium is increased in the serum of hyperthyroid dogs and human beings, and decreased in their hypothyroid state. Although no clinical application is immediately apparent, some metabolic connection may exist between this ion and thyroid function.

ENZYMIC RELATIONS

The enzymic processes involved in thyroid hormone synthesis and utilization are a subject of much biochemical research and controversy. It is generally agreed that peroxidase is the enzyme essential for the iodination of tyrosine and formation of thyroxin from diiodotyrosine. In support of this it is known that thiourea and thiouracil inhibit peroxidase action. To demonstrate this, Keston[25] incubated milk to which were added xanthine and radioiodine, resulting in thyroxin containing the I^{131}. The reaction was explained as one in which the xanthine oxidase in milk caused xanthine to release hydrogen peroxide which, in the presence of milk peroxidase, oxidized the iodide to iodine, then combined with tyrosine groups to form diiodotyrosine which coupled to create thyroxin. When thiouracil was added before incubation, thyroxin was not formed.[8]

The mechanism of thyroglobulin conversion to thyroxin before release probably involves a proteolytic thyroglobulinase, with an intermediary process concerned with the de-iodination of diiodotyrosine by desiodase, during which liberated iodide is returned to the iodide pool within the gland for reincorporation into thyroglobulin.[14] It has been postulated that the large thyroglobulin molecules can pass only into the follicles, but that along with them pass the small molecules of proteases which split the protein into smaller polypeptides which can escape. Other enzymes which may be involved in this stage are a proteolytic enzyme which frees tyrosine from hemoglobin, an alkaline glycerophosphatase, and a substance with mucolytic activity.

In 1950 Drabkin[26] reported that in rats who had their thyroid glands surgically removed or who had been treated with thiouracil, there was marked reduction in the tissue concentration, (especially in skeletal muscle) and total body content of cytochrome C; furthermore, in rats made hyperthyroid by thyroxin administration, there was a marked increase in cytochrome C. He hypothesized that this enzyme was the regulatory agent of tissue oxygen consumption.

Other experimental work[21] has shown that cytochrome oxidase, cytochrome C, succinoxidase, and amino acid oxidase are increased in the liver of animals made hyperthyroid and decreased in those hypothyroid. Xanthine oxidase and arginase are occasionally increased by thyroxin administration. Lactic dehydrogenase is increased in hypothyroidism. Acid phosphatase is decreased and alkaline phosphatase increased in hypothyroidism, and the latter is decreased in hyperthyroidism. It is concluded that thyroid hormone probably causes a release of multiple coenzymes, protein carriers, and other substances which are needed in the transfer of energy. The enzymic effects are apparent on practically all the organs of the body, in cellular metabolism, tissue maturation, and the metabolism of proteins, carbohydrates, fats, salt, and water.

HORMONE SYNTHESIS AND RELEASE

Thyroid hormone synthesis and secretion are mainly under the endocrine control of the thyroid stimulating hormone (TSH, thyrotropin) elaborated probably by the basophilic cells of the anterior lobe of the pituitary gland. The hormone is involved in all steps of thyroid hormone synthesis and release. For the latter action, TSH activates the enzymatic proteolysis of thyroglobulin. Thus, the "iodine trap" of I^{131} in the thyroid gland, compared with the plasma iodine concentration, normally occurs in a ratio of 250:1 and falls to 25:1 in hypophysectomized animals, being partly restored to its normal ratio by administration of thyrotropin. However, it does not appear to be the only mechanism of iodine binding; Albert[14] showed that after hypophysectomy thyroid glands still will bind 95 percent of administered I^{131}, though the process is much slower than normal.

Iodine in pharmacological dosage depresses thyroxin synthesis both through its inhibiting effect on thyrotropin release and direct effect on the thyroid gland, presumably by depressing the proteolytic enzymes. The serum iodide levels necessary for inhibition of organic binding are quantitative and are decreased in hyperthyroidism. In accordance with the general rule of endocrinological control, an excess of circulating thyroid hormone also decreases TSH release from the pituitary. These effects probably are indirect through the hypothalamus which also may be influenced by higher centers.

Certain physiological factors also are of interest in the control of the thyroid hormone. The rate of tissue demand for thyroxin is increased in puberty and pregnancy, but decreased in old age. Most forms of stress do not affect the thyroid hormone demand but exposure to cold does result in the need for more hormone to sustain metabolism.

Once goiter is established, iodine is of less benefit but a hyperplastic disorder may be converted into a more benign, colloid form, and occasionally a single nodule may subside completely. This action results from the iodine suppression of TSH and also some direct thyroid action. However, iodine in excess may result in hyperactivity of simple goiter and, if associated with a goitrogenic diet, may cause hyperthyroidism. Thus it is apparent why the control of thyrotoxicosis by Lugol's solution is such a delicate balance; the aim is to give enough to cause thyroid suppression and yet not enough to aggravate the condition.

TESTS OF THYROID FUNCTION

The determination of the organic plasma iodine, more commonly referred to as the protein-bound iodine (PBI) is a useful test of thyroid gland function, although its performance is complicated, time-consuming, and prone to numerous errors due to faulty technic or preparation of the patient. Kydd and co-workers[27] advocate determination of the serum-precipitable iodine (SPI) level as the most accurate index of thyroid function. The organic fraction in the plasma or serum is most representative of the thyroid state because the inorganic iodide fraction ordinarily is negligible, as is the amount in the red blood cells. The normal protein-bound iodine (PBI) is from 4.0 to 7.5 μg. per 100 cc. of serum or plasma; patients with hypothyroidism usually have values from 1 to 2.5 μg. percent and in hyperthyroidism levels, from 20 to 30 μg. percent may be found. However, nonrepresentative low readings may result from exposure to cold and possibly from mercurial diuretics shortly after administration; and elevated levels may be found normally during the first year of life and during pregnancy, especially within the first 16 weeks.

The most common source of error is the presence of iodine compounds elsewhere in the body of the individual tested. Authorities differ as to the time over which distorting effects may be exerted, but probably the iodine in the dyes used in myelograms, bronchograms, and the visualization of sinus tracts may be present for as long as two years; that in cholecystograms, for as long as six months; and that in urograms, for at least several days. Moreover, administration of Lugol's solution may cause an elevation of the blood iodine level for one month or longer. Even tincture of iodine on the skin or ingested sea food or certain vitamin preparations may give "false" elevations suggesting hyperthyroidism.

The use of tracer doses of radioactive iodine has afforded another useful, and probably most definitive, test of thyroid function. As has been stated previously, iodine so tagged, can

be traced by radioactivity counters to determine its eventual concentration in the thyroid tissue. With the scintillation head it is possible to use doses as small as 1 microcurie and still to scan very minute areas to measure uptake. Both beta and gamma rays are emitted. The beta rays cause tissue ionization and produce the therapeutic effect. The few gamma rays permit counter tracing but cause little biologic effect. For routine diagnosis most authorities consider that the 24-hour uptake measurement is best. The euthyroid range is from 10 to 15 percent; the hyperthyroid level, from 30 to 95 percent; and the hypothyroid range, below 15 percent. However, euthyroid patients occasionally may show uptake as high as 50 percent, and the noted overlaps may cause confusion in the unusual case. To solve this problem, the plasma-clearance test may be used with the I^{131} content measured in blood plasma every 30 minutes for two hours. This test is particularly valuable in differentiating hyperthyroidism from the occasional case of thyroid carcinoma with high uptake because the latter will take up I^{131} but will not retain it as will the true hyperthyroid. By the exposure of x-ray film to the radioactive uptake area, the "thyroid autograph" may be obtained for possible use in visualizing the type and localization of abnormality.

Drummy[28] evaluated the accuracy of radioactive iodine studies in detecting thyroid dysfunction in over 2,000 patients who were followed more than three and one half years. He found an excellent clinical correlation in that 93 percent of euthyroids showed from 15 to 50 percent uptake, no hypothyroids had more than a 15 percent uptake, and 96 percent of hyperthyroids had an uptake greater than 50 percent. He reported, moreover, that the uptake usually was normal when pituitary insufficiency was present. The uptake was increased artificially for from one to eight weeks after discontinuing antithyroid drugs, and the uptake was reduced to below 15 percent in many cases for as long as six months after cholecystography, two weeks after giving desiccated thyroid, and one week after intravenous pyelography or administration of Lugol's solution. Recent reports[29] also suggest that the results in tracer studies may not be representative in some cases of toxic nodular goiter.

URINE EXCRETION TESTS

The urinary excretion of radioiodine has been shown to be an accurate index of the thyroid state, because it is known that thyroidectomized patients excrete all administered I^{131} in the urine. Skanse[30] has described such an I^{131} tolerance test which he considers a more sensitive test than direct quantitative uptake measurement. One hundred and ten normal euthyroid patients

who had each been given 100 μg. of inactive iodine labeled with 100 microcuries of I^{131} were found to excrete 66 percent, with ranges from 44 to 88 percent, in the first 48 hours, 90 percent of which was in the first 24 hours. Of 187 hyperthyroids, 98 percent showed a low excretion (out of the normal range) and it was claimed that diagnostic basal metabolic rates would have missed 22 percent of these and protein-bound iodine determinations would not have picked up 7 percent. In 26 hypothyroids the excretion was either normal or increased but always delayed. Of 172 euthyroids with thyroid disease such as nontoxic goiter, carcinoma, and chronic thyroiditis, none showed less than normal excretion and very few more than normal levels. The test was influenced by the same factors as are the other tests, such as iodine-containing drugs, antithyroid drugs, and desiccated thyroid, and also by renal disease which reduced excretion. The excretion test was recommended particularly in detecting fictitious thyrotoxicosis due to desiccated thyroid administration, in which case the clinical findings, metabolic rate, and protein-bound iodine would indicate hyperthyroidism while this tolerance test would disprove that impression by showing almost complete I^{131} excretion.

By these various measures four determinations can be made to aid in diagnosis:[31] (1) The renal fraction (fraction of the I^{131} dose excreted in the urine), (2) the disappearance rate (proportionate rate of disappearance from the blood), (3) renal excretion rate (proportionate rate of excretion into the urine), and (4) the collection rate (in thyroid gland).

Hyperthyroid patients will show decrease in the renal fraction, marked increase in the disappearance and collection rates, and no change in the renal excretion rate.

Hypothyroid patients characteristically present an elevated renal fraction, reduced disappearance and collection rates, and an unchanged renal excretion rate.

The diagnosis of cases of obscure hypothyroidism may be aided by use of a thyrotropin response test, recently described by Jefferies and his associates.[32] A tracer dose of 10 microcuries of radioiodine is given and the three-hour uptake and the protein-bound iodine level are measured. Ten milligrams of thyrotropin then are given and the same procedure repeated the following day. It has been found that normal patients, including those taking desiccated thyroid, showed a brisk rise in I^{131} uptake from the thyrotropin effect, while hypothyroid subjects did not. This test has also been considered an accurate index of "thyroid reserve," because persons with only borderline thyroid function showed a normal I^{131} uptake originally but little or no increase in response to thyrotropin.

CLINICAL THYROID DISORDERS

Thyroid disorders may involve an increase or decrease in the rate of iodine metabolism. In patients with myxedema, metabolism is reduced to mere absorption and distribution throughout the body without concentration in the thyroid gland. A small amount of inorganic iodide circulates in the blood stream, with resultant decrease in the renal clearance, but even then the iodine in the muscles and other tissues is abnormally low. Cretinism shows the same general deficiency but tremendous thyroid enlargement may result from a hereditary defect preventing thyroid hormone synthesis from the iodides concentrated in the gland. This defect in organic binding of iodine is comparable with the action of the thioamide drugs like thiouracil, and can be well demonstrated in radioiodine studies. In cretins, I^{131} concentrated in the thyroid will be ejected promptly by potassium thiocyanate administration at any time, while in normal persons this action does not occur unless it is given less than one hour after the radioiodine—in other words, before iodine binding can occur.[14] Patients with these conditions are treated by replacement therapy, either with desiccated thyroid or thyroxin. Unlike the hypothyroidism following surgical or radiation thyroidectomy (in which case therapy may consist of immediate complete replacement dosage), patients with myxedema and cretinism should be treated with small doses gradually increased as tolerated to facilitate metabolic compensation. Thyroxin has the advantage of standardization in potency but, when given orally, its relative insolubility and imperfect absorption from the digestive tract make it less effective than desiccated thyroid. When used, it is given as the sodium salt of l-thyroxin, 0.1 mg., being equivalent to 60 mg. of desiccated gland. In the elderly patient, the daily maintenance requirement is often 60 mg. of desiccated thyroid, and in young active patients, the necessary dosage may be 120 to 180 mg. daily. The recently discovered drug, triiodothyronine, may have clinical application in the future.

In hyperthyroidism there is an increased rate of hormone synthesis and secretion causing reduction in the concentration of stored hormone and a rise in the tissue turnover to a tempo often three times that of normal metabolism. Various therapeutic measures are available to control this thyrotoxicosis. The thyroid gland may be removed surgically or destroyed in part by x-radiation or radioiodine, or certain drugs may be used to inhibit thyroid hormone synthesis and activity. In general, these antithyroid drugs are used as temporary measures for clinical control prior to, or in conjunction with, the more definitive surgical or radiation therapy, but a certain percentage of cases may go into complete remission from the antithyroid drug alone. Exogenous thyroid hormone itself reduces thyroid activity by its inhibition

of TSH and may be given with antithyroid drugs when it is urgent to put an overactive gland at rest, such as in rapidly progressing exophthalmos. As has been stated previously, iodides will cause a rapid decrease in the rate of thyroid hormone synthesis, presumably through TSH inhibition and also direct action on the thyroid hormone enzymes.

Thiocyanate drugs inhibit most of the thyroid's ability to concentrate the iodide ion, except in massive doses, and will cause reduced hormone activity; the gland enlargement which results in some cases usually can be overcome by administration of iodides concurrently. Many drugs are known to prevent the iodination of tyrosine and hormone synthesis even though iodides still are concentrated in the gland; these include the thioamide series, para-aminobenzoic acid, sulfonamides, and the aniline drugs. Potassium perchlorate has given promising results in preliminary tests. Thiouracil was one of the first drugs of this group and is perhaps 70 percent effective in treating a small gland in young patients. However, some toxic effects have been noted on blood and liver. The drug does not retard exophthalmos, and is thought by some to be carcinogenic. The newer drugs of this group, itrumil (sodium 5-iodo-2-thiouracil) and tapazole (methimazole), are frequently used to render a thyrotoxic patient euthyroid prior to surgical intervention or I^{131} treatment.

It is now generally agreed that hyperthyroid patients are best treated, in most instances, by I^{131}, which after a six- to eight-week lag is almost always effective in curing them of diffuse thyroid hyperplasia. Disadvantages in the use of I^{131} are the transient aggravation of thyrotoxicosis, the creation of hypothyroidism in perhaps 10 percent of the patients, and the failure to reverse eye signs. Probably carcinogenesis is not a real concern. It is not generally used on patients younger than 45 years, expecially during pregnancy, or in cases of suspected thyroid carcinoma, but it is recommended in most instances when these conditions do not apply. When surgical thyroidectomy has been performed and metastases of carcinoma are suspected or known, thyrotropin may be given to mobilize these areas and thus permit augmented I^{131} uptake and therapeutic effect.

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TRAUMATIC DISSECTING ANEURYSMS OF THE THORACIC AORTA

ROBERT E. PIERCE, *Major, USAF (MC)*

TRAUMA as a cause of cardiovascular lesions has long been recognized and is discussed in standard textbooks. One reaches the conclusion, however, after reading these discourses, that the authors are not absolutely convinced of the importance of trauma, and that many tend to pass over the topic lightly without making any definite conclusions.

Injuries from mechanical violence and their complications are of increasing importance and concern both in warfare and in civilian life. Our knowledge and understanding of the physiology and pathology of injuries, gained from World War II and the Korean battle front, have been greatly increased. This growing understanding is currently reflected in the increased emphasis, in the recent medical literature, placed on mechanical trauma to the heart and great vessels. In this connection traumatic aneurysms of the aorta are too often not recognized or even considered as a possibility before the patient comes to autopsy. This recognition of traumatic aneurysm is important both from a surgical standpoint and from the medicolegal causal relationship point of view.

Rice and Wittstruck[1] reported an aneurysm, in a pregnant young woman, of the first portion of the aorta caused by an automobile collision, in which the patient was struck violently on the upper chest. Stryker[2] described an aneurysm in an 18-year-old girl who died six months after an automobile accident in which her chest had been injured. Her condition was complicated by the development of subacute bacterial endocarditis in the aneurysm.

Shennan[3] contributed to the literature three cases of dissecting aneurysm in which the lesions were apparently produced by unusual athletic exertion. These were in males aged 13, 23, and 32 years. Stern[4] cited a case reported by Aschoff,[5] and a case of traumatic aneurysm from the records of the Supreme Court of Idaho. A case of dissecting aneurysm, following an automobile accident, ruptured into the left pleural cavity 16 days following the traumatic episode.[6]

From Edward W. Sparrow Hospital, Lansing, Mich.

This article presents three patients with fatal dissecting aneurysm of the ascending aorta following relatively minor traumatic episodes.

CASE REPORTS

Case 1. A 19-year-old woman was first seen by a physician at her home after she had fainted in a restaurant. On the night prior to the fainting episode she had attended an outdoor square dance. After she returned home from the dance she commented that she had "never exercised or worked so hard in my life."

She was unconscious long enough to be carried into the lounge. After she regained consciousness she relapsed each time she attempted to sit up. At this time she complained of a headache which radiated from beneath the lower jaw upward into the upper jaw and head. She became nauseated and vomited six times.

One of three siblings, her past history showed an episode of diarrhea shortly after birth. She had measles at six years of age and scarlet fever at eight years. She had had no operations and had never been hospitalized until the present illness. The family history was entirely negative. Numerous physical examinations of the patient throughout her life revealed no positive findings except for a concavity of the sternum. In the year prior to the illness she had fainted on two occasions in church. In both of these episodes unconsciousness was momentary.

The physical examination when the patient was first seen showed a well-developed, well-nourished white female. The blood pressure in the right arm was 78/40; in the left arm, 118/70. The sternum was concave. There was a prolonged diastolic murmur at the left of the sternum, loudest in the third and fourth interspaces, but heard also in the second interspace and at the apex. There were no other contributory findings.

Three days later her mother called the physician, stating that the patient felt that she "could feel something happening" in her chest. She was then hospitalized for a period of 10 days for diagnostic procedures.

At this time the blood pressure in the right arm was 60 to 78/40; in the left arm, 100/30. Her temperature was 98.6° F.; pulse, 100; respirations, 20 per minute. There was a coarse, heavy thrill palpable in the patient's neck and over the entire chest wall, anteriorly and posteriorly. A harsh, grating murmur was heard, loudest to the left of the sternal border. This murmur was so loud that the first impression was that it must be systolic, but correlation with the apical thrust and pulsations of the neck vessels showed it to be entirely diastolic. There was

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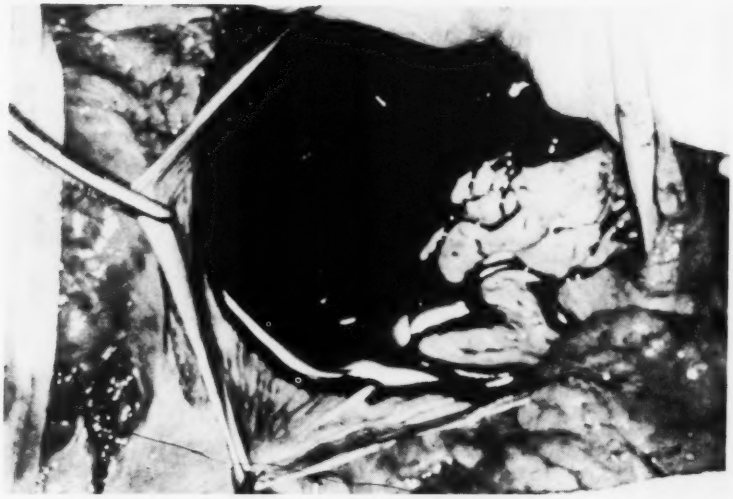

Figure 1 (case 1). The opened pericardial sac in situ. The sac is distended with blood and blood clot.

no sign of congestive failure in the neck veins, liver, or extremities. She was somewhat more comfortable in a sitting position, but could lie down without difficulty.

An orthodiagram was made and the patient was fluoroscoped, but the findings were difficult to evaluate because of the marked

Figure 2 (case 1). Interior of the left ventricle and the first portion of the aorta. The arrow points to the intimal tear.

sternal depression displacing the heart to the left. No definite cardiac abnormalities were noted. There were rather prominent pulsations of the aortic knob. Phonocardiography proved the murmur to be in diastole.

At this time a tentative diagnosis of a perforated or ruptured aortic valve leaflet was proposed. Subacute bacterial endocarditis was suggested as a causative agent. Numerous blood cultures were negative, however, and all laboratory findings were within normal limits. There was no temperature rise. Sixteen days following the onset of the illness she died suddenly.

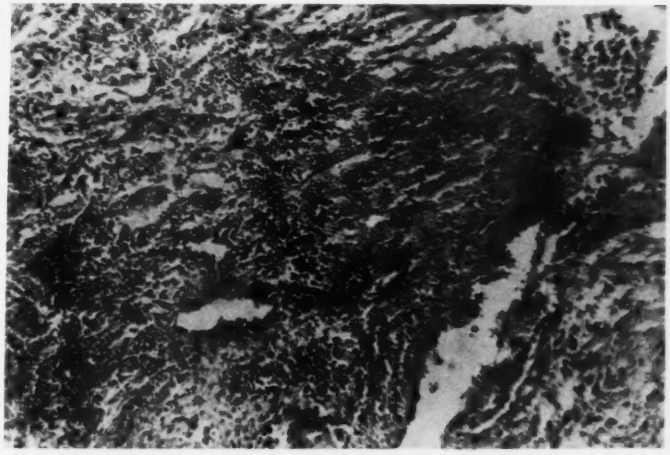

Figure 3 (case 1). Photomicrograph of the aortic media at the dissection site. The media is heavily infiltrated with erythrocytes, neutrophils, and small round cells. (Hematoxylin-eosin stain, × 100)

Significant findings at necropsy were limited to the heart and ascending aorta. The pericardial sac was markedly distended with more than 1,000 cc. of blood clot (fig. 1). The heart was of normal shape and weighed 325 grams. The epicardial surface was smooth with a slight increase in subepicardial fat. The myocardium was of normal consistency and color. The vessels showed no evidence of arteriosclerosis. Auricular and ventricular chambers showed no thrombi. The valve leaflets presented the usual appearance. No scarring or calcification was found.

About 1.5 cm. distal to the base of the aortic valve leaflets, on the posterior surface of the aorta, the intima and innermost portions of the media were completely transected by a slit 1.5 cm. in width (fig. 2). From this slit the media had been dissected downward for a distance of 1.5 cm. to a small slitlike aperture, 1 cm. in width, which perforated the external portion of the media

and the adventitia on the right posterolateral aspect of the aorta. This aperture communicated with the pericardial sac and was entirely within the confines of the pericardial sac. There was no gross change of the aortic intima elsewhere.

Microscopic examination showed the following: The aortic intima was in good condition. At one end of the section the media was of usual appearance except for scattered polymorphonucleocytes and round cells. The other end showed separation of the media at about the junction of the outer and middle thirds (fig. 3). Evidence of an old hemorrhage with numerous hemosiderin-containing phagocytes was found in this area. The inner surfaces of the defect showed a layer of fibroblasts. Numerous polymorphonucleocytes and round cells were present in the media on both sides of its separation. There was no evidence of atheromatous change.

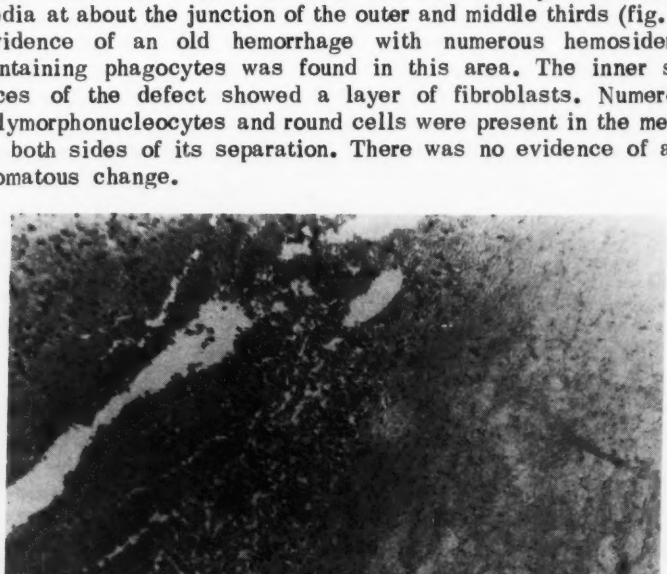

Figure 4 (case 2). Photomicrograph of the dissection site. The dissected area is filled with blood clot. The media shows small round cell infiltration. (Hematoxylin-eosin stain, × 100)

Case 2. While at work a 39-year-old man slipped on an icy ramp and fell backward, striking the upper posterior chest. Following the accident he complained of severe pain in the back. Examination showed no evidence of fracture or other injury. The pain continued for several days and gradually subsided. On the tenth night following the accident he complained of sudden severe pain in the chest associated with dizziness. This continued until the following morning when he suddenly died.

No contributory personal or family history was obtained.

Significant necropsy findings were limited to the heart and aorta. In the ascending aorta, immediately above the aortic valve, were found several small rents of the intima. Beneath these rents there was an extensive dissecting aneurysm of the aortic wall. The structures of the media were separated by an organized blood clot. There was extensive necrosis of the aortic wall. Hemorrhage extended into the base of the heart. The pericardium was not perforated and there was no blood in the pericardial sac.

Microscopic examination (fig. 4) showed no changes of the aortic intima. There was wide separation of the media at about its middle by large amounts of fresh blood. The red blood cell outlines were intact. Areas with evidence of older hemorrhage with phagocytes containing hemosiderin were found at the periphery. Numerous polymorphonucleocytes were present at the edges with small numbers scattered through the mid-portion. Small numbers of leukocytes were found immediately beneath the intima. The media surrounding the hemorrhagic area showed early necrosis. There was no evidence of atheromatous change.

Case 3. A 24-year-old male athlete who was an inmate of a state reformatory was admitted to the reformatory hospital because of a "cold." Upon admission his temperature was 100° F., pulse was 100 per minute, and respirations were 20 per minute. Physical examination was otherwise normal.

The patient claimed to have had rheumatic fever in childhood but this information was regarded by his physician as unreliable. He denied all other childhood diseases or venereal disease. He had never been hospitalized prior to the present illness. He was one of two siblings. There was no contributory family history. For the three years prior to his illness he had done considerable boxing. A few days prior to the onset of the illness he had participated in a boxing match.

Upon admission he was placed on bed rest and was given 50,000 units of aqueous penicillin every three hours. He had no further complaints and was apparently progressing satisfactorily. On the third day of hospitalization, while making a routine check, the attendant found the patient dead in bed.

The significant findings at autopsy were limited to the heart and aorta. The pericardial sac was markedly distended with a large amount of blood and blood clot. The myocardium and valves showed no gross changes. The coronary arteries showed no evidence of atheromatous change. Immediately above the aortic valve was a narrow tear of the intima. The media was dissected downward to an opening into the pericardial sac.

Microscopically the intima showed no changes. Throughout the media and extending into the adventitia (fig. 5) was evidence of much old and recent hemorrhage. Numerous phagocytes con-

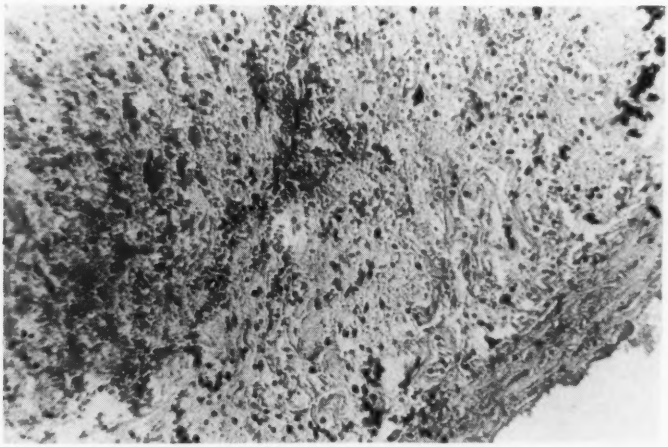

Figure 5 (case 3). Photomicrograph of aortic intima (lower right-hand corner) and media, with round cell infiltration of the media, and evidence of fresh hemorrhage. (Hematoxylin-eosin stain, × 100)

taining hemosiderin were present throughout. Numerous polymorphonucleocytes and round cells were noted in the media. Large areas of the surrounding media showed liquefaction necrosis. Considerable fibroblastic and angioblastic activity was apparent. There was no evidence of atheromatous change in the aorta. No evidence of syphilis was found.

DISCUSSION

Traumatic lesions of the aorta occur most frequently at a point one to two centimeters above the aortic valve,[7] as was seen in each of the above patients. The next most common site is at the isthmus near the attachment of the ligamentum arteriosum.

Various theories have been advanced for the predilection of these regions to trauma. The generally accepted factor is the fixation of the first portion of the aorta by the fibrous union between the aorta and the pulmonary artery. Rindfleisch[8] demonstrated bandlike thickenings of the pericardium passing from the pulmonary trunk to the aorta a short distance above the cusps. These, together with the ligamentum arteriosum, partially immobilize the first portion of the aorta. Thus, sudden motion of the mobile portion of the vessel may cause a tear at the point of fixation.

A second factor in the development of traumatic aneurysms is an increase in the intra-aortic pressure. Most observers[9] are of the opinion that, irrespective of the underlying cause, a sudden exertion may increase the blood pressure sufficiently to produce a break in the weakened intima, permitting blood to extravasate rapidly into the media.

A combination of the above two factors in the patients described here must be presumed. Attempts to rupture healthy aortas of rabbits or human beings experimentally have shown that they can withstand internal pressures of from 800 to 1,200 mm. Hg.[7] Thus for the establishment of the process the intima must be weakened. The simultaneous weakening of the intima by stress and the sudden increase in blood pressure is assumed to be the causative action in these patients.

In those patients with dissecting aneurysms not associated with trauma, the intima is weakened by changes of the underlying media. Focal areas of necrosis are commonly found. In some cases the muscle is first affected, while in others it is the elastic and collagenous connective tissues. The general term medionecrosis is applied to these changes. In some cases the presence of mucoid material in cystic spaces (idiopathic cystic medionecrosis) has been described. Medial degenerative changes of the aorta are found frequently at autopsy when no aneurysm is present. The incidence appears to be somewhat higher in hypertensives.

The cases presented here are considered to be traumatic in origin. No evidence of previous pathologic change of the aorta was found in any of the patients. The development of vascular disease or spontaneous aneurysm in a 19- or 24-year-old person is most uncommon. With the finding of intimal rents and the short time elapsing before death, we must conclude that the traumatic episode was the causative factor.

Following the tear in the intima, or the formation of an intramural hematoma, the blood dissects between the outer one third and inner two thirds of the media. The dissection may proceed downward to rupture into the pericardial sac with resulting hemopericardium and cardiac tamponade as was seen in two of the patients. It may also rupture into the pleural space with hemothorax and death from exsanguination. Dissection may occur upward for a varying distance with re-entrance into the normal channel. The dissection may eventually extend the entire distance of the aorta. If rupture does not occur the false channel may eventually become endothelialized, producing the so-called "double-barreled aorta," and the patient may live for many years,

even to die of some other disease. This happens to about 15 percent of these patients.[9]

SUMMARY

In each of three patients, a dissecting aneurysm followed a traumatic episode. In each patient a transverse tear of the intima just distal to the aortic valve was found. All three died, two with rupture into the pericardial sac and resultant cardiac tamponade, the third with hemorrhage around the base of the heart. No evidence of previous pathologic processes were found in any of the patients.

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LOBOTOMY IN TERMINAL CANCER

Lobotomy alters the attitude of the patient toward his pain. The pain of terminal cancer is compounded of the foreknowledge of death, the hopelessness that comes with an incurable disease, and the endless vista of pain to come. Therefore, lobotomy is more effective in those patients whose emotional reactions to the disorder are as serious as those concerned with pain itself. Perhaps it would be better to say that lobotomy relieves the suffering of terminal cancer. When suffering is abolished, even though pain may still be perceived, an objective has been gained. And certainly, in a patient faced with death from advancing carcinoma, some degree of equanimity, if not euphoria, is well to have in order to bear the terminal stages.

—WALTER FREEMAN, M. D.
in *Journal Lancet,*
p. 265, July 1954

DETERMINATION OF THE RESIDUAL AIR VOLUME BY THE HELIUM DILUTION TECHNIC

JAMES C. SYNER, *Captain, MC, USA*

A WATERLESS basal metabolism machine and a helium meter have been used in combination to carry out residual air determinations in the pulmonary function laboratory of this hospital during the past three years. A specific procedure has been standardized and has been entirely satisfactory in simplicity, ease of operation, correlation with other recognized procedures (table 1), and accuracy of duplicate determinations (table 2). It has also proved to be of great value in the study of respiratory disease.

The use of the inert gas, helium, for the determination of pulmonary volume has been reported previously.[1,2] The use of the katharometer was described in detail by McMichael[3] who used hydrogen as the inert gas. The present report of further experience with helium and modifications in technic developed over a three-year period outlines the procedure in detail so that the apparatus and testing method can be used with ease and accuracy.

PRINCIPLE OF THE METHOD

The physical phenomena involved in the analysis are discussed in detail elsewhere.[1-3] A helium meter can analyze the percent of helium by volume in wet air from 0 to 15 percent. Continuous analysis of the gas mixture is made by passing the gas sample through the instrument. The gas diffuses into the instrument, changing the resistance of a set of heated platinum wires in one arm of a Wheatstone bridge circuit. The helium gas effects an increase in the thermal conductivity of the gas around the platinum wires, thus cooling the wires and raising their resistance. A second arm of the Wheatstone bridge circuit contains a set of platinum wires sealed in an atmosphere of wet air which acts as the reference gas. A change in the resistance of the first set of wires, proportional to the percentage of helium in the sample gas, results in imbalance of the Wheatstone bridge circuit which produces a millivoltage across the indicator. The fundamental principle is the dilution by the patient of the known volume of helium in the closed circuit system during a measured

From Walter Reed Army Hospital, Washington, D. C.

TABLE 1. *Comparison between measured and predicted values of residual lung volumes for normal men in various age groups*

Author	Number of men	Age group (years)	Measured (cc.)	Predicted (cc.)	Difference (cc.)
Robinson[11]	12	16-19	1,300	1,160	140
	11	20-29	1,560	1,130	430
	11	31-38	1,600	1,310	290
	10	40-48	1,490	1,320	170
	8	48-55	2,150	1,475	675
	7	59-66	1,720	1,640	80
	5	71-91	1,920	1,300	620
Syner (this article)	6	16-19	1,109	1,202	93
	13	20-29	1,347	1,258	89
	9	31-38	1,533	1,413	120
	10	40-48	1,500	1,397	103
	8	48-58	1,979	1,640	339
	13	59-66	1,798	1,920	122
	3	71-80	1,795	1,498	297

breathing period. The dilution occurs as the helium is distributed throughout the patient's functional reserve plus tidal volumes.

PROCEDURE

Preparation of apparatus. The closed circuit system is arranged according to the path of air flow established by the blower in the spirometer (fig. 1). If necessary a small soda-lime container may be inserted on the expiratory side of the circuit. The use of large bore rubber tubing is necessary to reduce peripheral resistance. Tubing should be of maximum rigidity to prevent change in the lumen which will effect a variation in the total volume of the circuit. Tubing connections are sealed with rubber cement to prevent leaks in the system.

Accurate calibration of the spirometer bellows or bell is necessary. The method of water displacement of air utilized in this laboratory has been discussed in detail in a previous article.[4]

The volume of the closed circuit system with depressed bellows or bell must be determined by one of two methods; either by dimensional calculations or by the McMichael method of measured dilution of a known volume of gas. Most investigators have found the McMichael method more convenient and accurate. Known amounts of helium are introduced into the system in sequence and meter readings obtained for each sample. From the known volume of added helium and oxygen and the helium concentration (obtained from the meter reading), the volume of the system is calculated as follows:

$$VS = \frac{100\ VHe - (VO + VHe)}{\%He}$$

Where VS is the volume of the system, VHe is the volume of helium, VO is the volume of oxygen, and % He is the percent by volume of helium obtained from the helium meter.

Preparation of kymograph paper. Preparation of the standard kymograph paper is illustrated in figure 2. Line 1 is the level of the stylet along the vertical with complete depression of the bellows. Line 2 is 8 cm. below line 1 and is the point of reference for oxygen volume. Helium is introduced between lines 2 and 3 which is 11 cm. below line 1.

First stage in determination of the residual volume. A conventional respiratory tracing is obtained from a spirometer containing pure oxygen or an oxygen-air mixture. During this procedure the tidal volume, expiratory reserve, and inspiratory maximum are recorded separately. It is necessary to know the expiratory reserve in order to calculate the residual volume. The details for preparing the patient and obtaining the separate volumes were discussed in a previous article.[4]

TABLE 2. *Repeated determinations with helium on different days showing reproducibility of residual air volumes*

Age (years)	Height (cm.)	Weight (lb.)	Sex	Clinical status	Residual air (cc.)	Deviation from mean (cc.)	Mean (percent)
18	180	185	Male	Normal	1,532 1,600 1,564	−33 35 − 1	2.05 2.23 .01
21	167	151	Male	Normal	1,065 1,153 1,110	−44 44 1	3.98 3.98 .09
22	168	163	Male	Normal	1,394 1,301	46 −47	3.42 3.42
35	175	148	Male	Normal	1,201 1,331	−65 65	5.15 5.15
35	171	112	Male	Emphysema, severe	5,410 5,780 5,196	− 52 318 −267	.095 5.82 4.97
38	152	151	Female	Sarcoid	1,540 1,618	39 −39	2.41 2.41
47	185	180	Male	Emphysema, severe	5,420 4,980 5,610	83 −357 273	1.55 6.75 5.1

TABLE 2. *Repeated determinations with helium on different days showing reproducibility of residual air volumes*—Continued

Age (years)	Height (cm.)	Weight (lb.)	Sex	Clinical status	Residual air (cc.)	Deviation from mean (cc.)	Mean (percent)
51	175	176	Male	Normal	1,728 1,801	−37 37	2.1 2.1
59	165	139	Male	Emphysema, moderate	2,460 2,377 2,510	11 −79 61	.45 3.22 2.49

Introduction of oxygen into the system. The closed circuit is washed out with oxygen which is bubbled through a water bottle system and then into the spirometer by way of the S-2 valve (fig. 1). All gases introduced into the system during the procedure for residual air determination must be saturated with water vapor. This meets the physical requirements of the meter which has been calibrated to wet air. Approximately 10 liters of oxygen

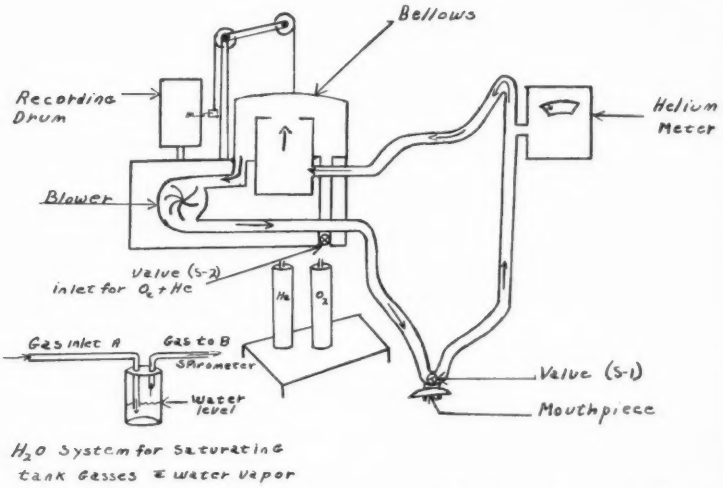

Figure 1. Spirometer circuit for determination of the lung volume using helium.

are necessary to adequately flush nitrogen and traces of helium of any prior test from the system. The S-1 valve is opened and the bellows depressed fully to bring the stylet to the level of line 1. The S-1 valve is closed, S-2 valve opened, and oxygen introduced in sufficient volume to carry the stylet to a level with line 2. The helium meter is corrected for mechanical zero, the battery is adjusted, and electrical zero is confirmed. The spirometer blower system is turned on for three minutes to circulate the gas throughout the system. Due to heat generated from the motor-driven blower system, an increase in gas volume may occur. This can be corrected at the end of the circulation period by opening the S-2 valve and allowing the excess gas to escape. The helium indicator must remain at electrical zero during this circulation period. If any millivolts are registered, further oxygen flushing is necessary.

Introduction of helium into the system. Helium should be introduced into the system to bring the stylet from line 2 to line 3 (8 cm. line to 11 cm. line). This must be done carefully and with absolute accuracy. The blower system is then turned on and

gases allowed to circulate. After four or five minutes, the indicator needle on the helium meter will stabilize and the initial percent concentration of helium can be noted on the meter. At this point the battery zero is rechecked before the final reading of the initial helium concentration is made.

Preparation of the patient. The patient is given detailed instructions of the procedure before the test is started. Using a three-way valve system and an oxygen reservoir bag (10 liters anesthesia type) connected to a tank of oxygen, the patient breathes oxygen for a period of five minutes. The expired air is blown off into the atmosphere. The oxygen breathing washes nitrogen from the lungs, and is carried out at the same time that the helium-oxygen mixture is circulating throughout the closed circuit system to stabilize the gases circulating through the helium analyzer. Then the patient is connected to the valve system by a conventional rubber mouthpiece, a noseclip is secured in place, and he is told to carry on quiet, tidal respirations. Because carbon dioxide is absorbed as rapidly as it is formed, nitrogen is eliminated by the oxygen breathing, and the thermal effect of the oxygen is neutralized by rheostat adjustment of the meter, only changes in helium concentration will influence the indicator reading.

At the conclusion of oxygen breathing the patient should indicate his breathing cycle by raising the forearm on inspiration and lowering it on expiration. At the conclusion of a normal expiration the patient is told to hold his breath and shift to an adjacent rubber mouthpiece which connects the patient to the spirometer system. When the mouthpiece is secured in place the patient is told to inhale and then to continue on with normal tidal breathing. A separate valve system for oxygen breathing is used to reduce the dead space volume which complicated the five-way valve system used earlier in the study. The act of shifting from one rubber mouthpiece to an adjacent one while holding the breath has been executed with ease by all patients after they have been instructed and given several practice trials.

As the patient carries on with tidal breathing in the spirometer system, the known volume of the system will decrease because of the oxygen consumption and the transfer of helium into the patient's lung. Oxygen is introduced into the system at a rate equal to the patient's consumption. To do this accurately it is necessary to follow the respiratory tracing, watching the relation of the stylet to line 3 at the end of a normal expiration. At the end of from two to four minutes the reading of the helium meter will be constant, and the original volume of the system will be maintained by accurate oxygen replacement. This breathing is

continued for six minutes in order to establish conclusively that the equilibrium of the helium gas distribution has taken place. Patients with normal pulmonary function will reach helium equilibrium in about two to three minutes, whereas patients with emphysema will require a longer time in proportion to the degree of their emphysematous decompensation. The patient is removed from the spirometer system and the S-1 valve closed when the stylet is at line 3, at the end of a normal expiration, thus returning the system to its original volume.

Calculations for total lung volume and residual air. The McMichael method is the basic principle employed in this procedure and calculations are made as follows:

(1) Initial concentration of helium

$$\%Hei = \frac{VHe \times 100}{VA}$$

Where VHe is volume of helium, VHei is initial percent concentration of helium and VA is total volume of the system including gases added.

A. Clearing of fractions

$$(VA)\ (\%Hei) = \frac{(VHe)\ (100)\ (VA)}{(VA)}$$

$$(VA)\ (\%Hei) = (VHe)\ (100)$$

(2) Then the unknown lung volume is added to the system so the final concentration of helium is

$$\%Hef = \frac{VHe \times 100}{VA+VX}$$

Where %Hef is the final percent concentration of helium and VX is the unknown lung volume.

(3) Substituting of (1) A in (2)

$$\%Hef = \frac{(VA)\ (\%Hei)}{(VA + VX)}$$

(4) Solving for the unknown lung volume VX

$$(VA + VX)\ (\%Hef) = \frac{(VA)\ (\%Hei)\ (VA + VX)}{(VA + VX)}$$

$$(VA + VX)\ (\%Hef) = (VA)\ (\%Hei)$$

Factoring

$$VA\ (\%Hef) \times VX\ (\%Hef) = (VA)\ (\%Hei)$$

$$VX\ (\%Hef) = VA\ (\%Hei) - VA\ (\%Hef)$$

$$VX\ (\%Hef) = VA\ (\%Hei) - (\%Hef)$$

$$VX = \frac{VA\ (\%Hei) - (\%Hef)}{\%Hef}$$

(5) Basic equation for calculation of the unknown lung volume is

$$VX = \frac{VA\ \%Hei - \%Hef}{\%Hef}$$

VX = sum of expiratory reserve plus residual volume.

To obtain residual volume, subtract the expiratory reserve from VX. The total lung volume is obtained by adding the vital capacity and residual volume.

The calculations made in the above equation must be corrected to body conditions; the factors of body temperature, surrounding barometric pressure, and saturation with water vapor which commonly are abbreviated BTPS.

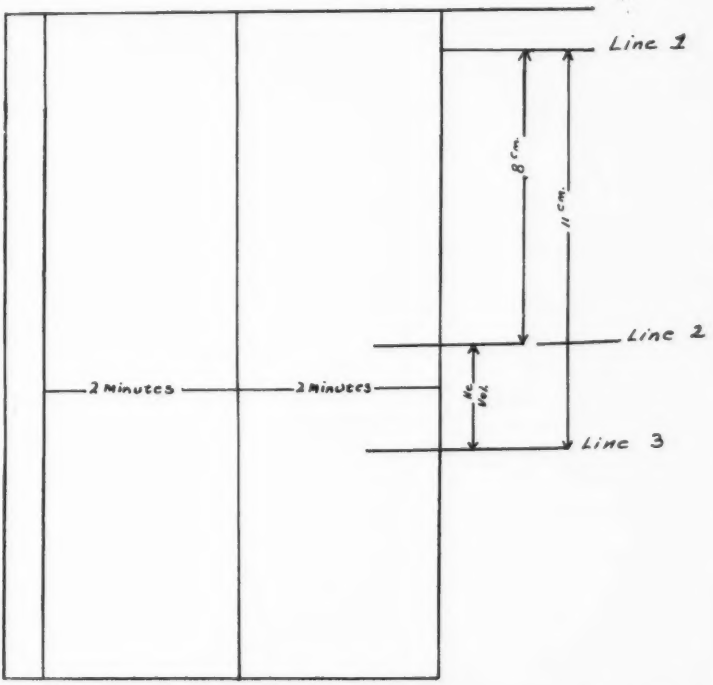

Figure 2. Marking kymograph paper. Line 1 indicates position of stylet with bellows fully depressed. Eight centimeters is the volume of oxygen added and three centimeters is the volume of helium added.

Other corrections involve the subtracting of the volume of air which in the valve and mouthpiece totals 36 cc. Accurate cor-

TABLE 3. *Relation of residual air to total lung volume in normal persons*

Age (years)	Residual air × 100 / Total lung volume (cc.) (Mean of two observations)	Group 16-29 years (20-25 percent)*	Group 30-49 years (25-30 percent)*	Group 50-69 years (30-35 percent)*
22	1020 × 100 / 5820	18		
23	1100 × 100 / 5170	21		
27	1763 × 100 / 6354	24		
30	1900 × 100 / 6410		29.6	
34	1400 × 100 / 6660		21.2	
39	1326 × 100 / 4756		28	
40	1570 × 100 / 5720		27.5	
47	2365 × 100 / 7665		31	
53	1820 × 100 / 5000			32
57	1888 × 100 / 5283			35.5
57	2100 × 100 / 5860			36
58	2410 × 100 / 6770			35.4

TABLE 3. *Relation of residual air to total lung volume in normal persons*—Continued

Age (years)	Residual air × 100 / Total lung volume (cc.) (Mean of two observations)	Group 16-29 years (20-25 percent)*	Group 30-49 years (25-30 percent)*	Group 50-69 years (30-35 percent)*
59	1587 × 100 / 5230			30.4
60	1516 × 100 / 5413			33.6
60	1348 × 100 / 4509			29.8
60	2650 × 100 / 8290			32.3
63	1980 × 100 / 5500			36
72	1651 × 100 / 4500			37.6

*Percentages quoted from Baldwin, Cournand, and Richards.[6] Measured residual air values for any age group show marked variation, and will demonstrate slight overlap with other age groups as is demonstrated in this data.

rection factors for helium absorbed during testing are not available at this time, and reliable investigation of this point remains a task for the future. In an early report Meneely and Kaltreider stated that 10 cc. of helium were absorbed by the body during the period of testing. In a more recent article these authors state that further experience casts doubt upon the validity of the value;[5] however, they continue to subtract 110 cc. from the observed mid-capacity as the amount attributable to a loss of 10 cc. of helium with an average mid-capacity of 2 liters. This is a very arbitrary figure and in a standardization of the testing procedure with normal values for use in a given laboratory, the estimation may be unacceptable. Our data is reported with this correction.

A correction for the increase in concentration of inert gases in the lungs has been recommended by others.[3,5] When the res-

piratory quotient is approximately 0.8, the actual volume of the functional residual air is about 30 cc. less than that calculated. This is due to differences in concentration of inert gases between the lung and spirometer system. McMichael stated that the inert gaseous composition of the air in lungs would be identical with that in the spirometer only if the respiratory quotient was unity (1.0). This correction is not applicable to the testing procedure being reported, because nitrogen is eliminated by the oxygen breathing.

Comparative results and reduplication of results. Table 1 gives the results of helium dilution tests for residual air in 62 patients compared with Robinson's data reported in an article by Baldwin and associates.[6] In the later series the residual air was measured by the oxygen dilution method of Darling.[7-9] It is impossible to make detailed comparisons because data on the height, weight, and body surface of individual patients are not available, but inspection of the data confirms a satisfactory clinical correlation.

Table 2 gives results of serial determinations in individual patients and points out the slight degree of variation in duplicate tests. Meneely and Kaltreider also reported similar variation in duplicate determinations with this testing procedure. Due to the decreasing efficiency of the intrapulmonary mixing characteristic of emphysematous decompensation, the degree of variation increases as the volume of the residual air increases.

One of the most meaningful methods for expressing the results with this technic is to compare the ratio of residual air to total lung volume with those recommended by Baldwin (table 3). This ratio varies according to sex and age, but rarely is above 35 percent. The ratio above 35 percent is usually interpreted as a pathologic degree of residual air, indicative of generalized emphysema.[10] The results in table 3 demonstrate that the testing procedure provides values entirely consistent with the best available ratios.

SUMMARY

A simplified technic for residual air determination, using the principle of helium analysis with the katharometer, has been standardized with normal individuals and the results compared to another large series in which a different technic was employed. The technic has been entirely satisfactory in its simplicity, ease of operation, correlation with other recognized procedures, and accuracy of duplicate determinations. Although a waterless basal metabolism machine was used as the spirometer in this study, any type of bellows, bell type spirometer, or respirometer is suitable. The presence of a blower system in the spirometer is desirable for effecting even distribution of the gas mixture.

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CARDIAC ARREST

In both the prevention and treatment of cardiac arrest, adequate blood oxygenation and maintenance of circulating blood volume are the essential factors. It is possible that many instances of cardiac arrest could be prevented if proper precautions were maintained. The grave consequences of the combination of anoxia and a high level of circulating epinephrine on cardiac function can be produced both in the operating room and the laboratory. The fearful patient subjected to a hurried induction of anesthesia or to too much anesthetic agent in the absence of oxygen may be expected to behave in the same manner as the laboratory animal who is partially suffocated deliberately and at the same time given epinephrine experimentally to produce ventricular fibrillation or cardiac standstill.

—BRIAN BLADES, M. D.
in *Journal of the American Medical Association,*
p. 711, June 19, 1954

DEMARCATION OF BODY REGIONS AND BATTLE CASUALTY ANALYSIS

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THE systemic study of the localization of war wounds is dependent upon a standard demarcation of body surface regions and the use of precise terminology as to position and direction.

In studying wounds incurred in the Korean conflict,[1,2] and in those of previous wars, it is apparent that the various boundaries assigned to regions and areas of the human body have been shifted to suit the convenience of the investigator. There has also been much casual disregard for proper anatomic terminology. This state of affairs is not confined to the liberal interpretation of medico-military scientists. It has been a problem long recognized by academic anatomists internationally, and much thought has been devoted to standardization of terminology and anatomic definition. With few exceptions, the Basle Nomina Anatomica (B. N. A.), the Birmingham Revision (B. R.), and the Jena Nomica Anatomica (J. N. A. or I. N. A.) are satisfactory standards for military usage. One notable exception, however, lies in the definition of the position of the body as upright, with the upper extremities at the sides, the forearms and hands in full supination. This position of the forearms and hands is unnatural for a soldier in combat and, when direction of the wounding agent and angle of missile incidence are taken into consideration, is misleading. A position of the body upright, with the arms at the sides, the palms directed medially and the fingers extended is preferred.

In World War II, Churchill[3] recognized the importance of adopting some universal standard of anatomic regional demarcation. Beebe and De Bakey[4] also encountered the frustration of nonspecific, misleading terms used to define position and direction and made a plea for uniform usage and accuracy in medical reporting. In their early casualty surveys, Burns and Zuckerman[5] were aware of this need for conformity and set up their standard of regional demarcation. In studies of battle casualties (1950-1953) in Korea,

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we,[1,2] lacking any prescribed standard, attempted to formulate a similar system. Because of the demand for more and more specific localization of wounding, the problem has now gained added significance. Certain aspects of body armor design are intimately dependent upon such information. Other future demands must be anticipated.

Military medicine with its tendency toward conformity in general principles is ideally suited for the adoption of standard terminology and definition. By adhering to them each medical officer can contribute accurately to the research phase of casualty analysis and each medical report becomes one of statistical importance. In view of the rapid turnover of medical officers entering the military service from and returning to civilian life, it is only reasonable that they be provided with such a standard, rather than be permitted to exercise individual preference without an awareness of eventual statistical goals.

In view of these facts, an effort has been made to review all available standards of anatomic regional demarcation and to devise a composite system which will provide accurate data on the exact localization of wounding. Simplicity and ease of use have been foremost considerations in this effort. Proper anatomic terminology regarding position and direction has been long established. It remains only to encourage its common and consistent use.

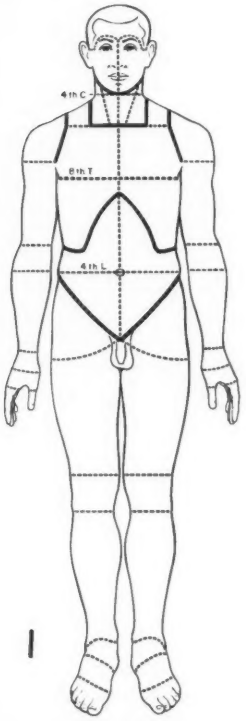
In order to be of practical value under the stresses of combat medical care, any system of anatomic regional demarcation and terminology as to position and direction must be easy to visualize, to remember, and to use. In addition, there must be clear indoctrination of personnel as to the reasons for introducing such a standard and a recurrent appeal for accuracy in its use. Much medical reporting in time of war is of necessity completely dependent upon individual responsibility. Eventual statistical data are, therefore, controlled directly by the formulation and adoption of universal procedures and proper guidance in their application.

The standard to be presented was developed primarily to fill the need encountered in wound ballistics studies of battle casualties in Korea. It is of first importance to establish and record the exact location of the missile hit or its equivalent factor, the wound itself. The number of hits and their specific location comprise a single order of data which must stand alone in statistical tabulation. The proposed standard of surface demarcation allows for this requirement; it is also adaptable to a consideration of missile passage and wounds of exit. It is emphasized, however,

that these data, although related, are of separate statistical significance.

BODY REGIONS

The following standard for demarcation of anatomic surface regions is proposed. Each region will be defined individually describing all boundaries formed by contiguous anatomical structures (figs. 1-6).



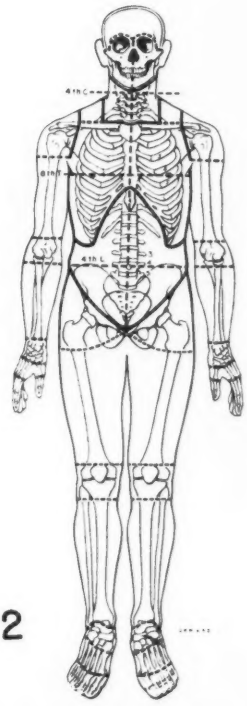
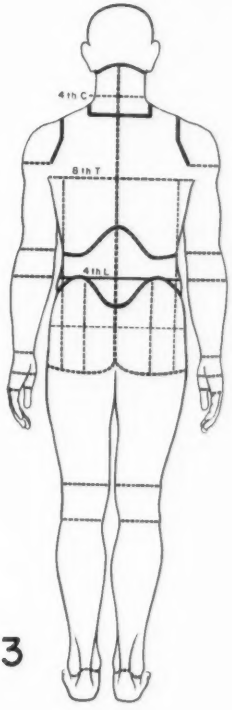


Figure 1. Body regions, anterior surface view. Figure 2. Body regions, anterior skeletal view.

Head. The head is that part of the human body enclosed by a line beginning anteriorly and superficially from a point in the midline located at the nasofrontal junction and extending laterally on both sides along the supraorbital margin sloping downward to the zygomatic arch and to the mastoid process, thence posteriorly along the superior nuchal line to the external occipital protuberance.

Face. The face is that part of the human body enclosed by a line beginning anteriorly and superficially from a point in the midline located at the nasofrontal junction and extending laterally on both sides along the supraorbital margin, sloping downward to the zygomatic arch and mastoid process, thence along the ramus of the mandible to its angle, the inferior border, and mental protuberance anteriorly. The ear is included as a facial structure.



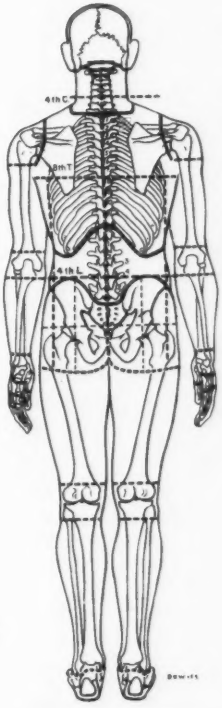
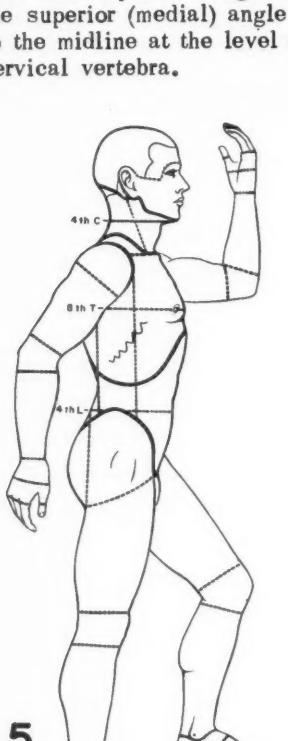


Figure 3. Body regions, posterior surface view. Figure 4. Body regions, posterior skeletal view.

Neck. The neck is that part of the human body enclosed superiorly by a line beginning on the anterior surface at the mental protuberance and extending laterally on both sides along the inferior border of the mandible to the angle and upward along its ramus to the mastoid process, then posteriorly along the superior nuchal line to the external occipital protuberance. The neck is enclosed inferiorly by a line beginning on the anterior

surface at the suprasternal (jugular) notch and extending laterally on both sides along the superior margin of the clavicle to a point at the junction of its medial and middle thirds, then posteriorly over the superior margin of the trapezius muscle in line with the superior (medial) angle of the scapula and directed medially to the midline at the level of the spinous process of the seventh cervical vertebra.



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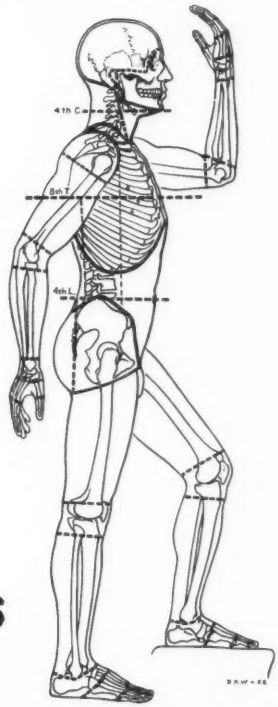

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Figure 5. Body regions, lateral surface view. Figure 6. Body regions, lateral skeletal view.

Thorax. The thorax is that part of the human body enclosed superiorly by a line beginning on the anterior surface at the suprasternal notch and extending laterally on both sides along the superior margin of the clavicle to the junction of its medial and middle thirds, then posteriorly over the superior margin of the trapezius muscle in line with the superior angle of the scapula and directed medially to the midline at the level of the spinous process of the seventh cervical vertebra. The thorax is enclosed

inferiorly by a line beginning on the anterior surface at a point in the midline of the subcostal angle at the junction of the xiphoid process with the body of the sternum and extending laterally downward on both sides along the inferior margins of the costal cartilages of the lower six ribs and then to the spinous process of the twelfth thoracic vertebra. Laterally and superiorly the thorax is demarcated by the limits of the upper extremity.

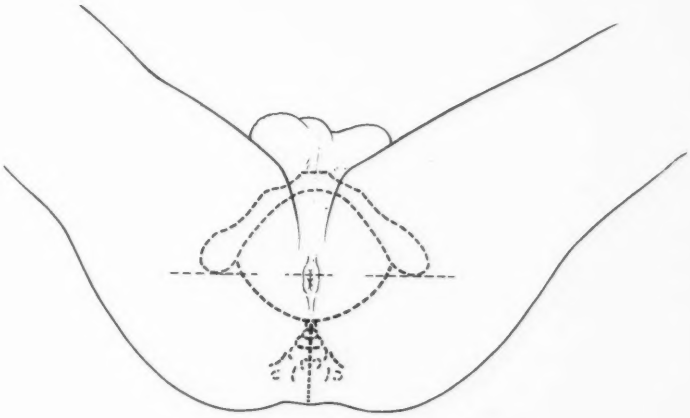

Figure 7. Perineum.

Abdomen. The abdomen is that part of the human body enclosed superiorly by a line beginning on the anterior surface at a point in the midline of the subcostal angle at the junction of the xiphoid process with the body of the sternum and extending laterally downward on both sides along the inferior margins of the costal cartilages of the lower six ribs, and then to the spinous process of the twelfth thoracic vertebra. The abdomen inferiorly is enclosed by a line beginning on the anterior surface at a point in the midline of the symphysis pubis and extending laterally on both sides along the inguinal ligaments to the anterior superior iliac spine, sloping over the crest of the ilium and posteriorly to the base of the sacrum in the midline.

Perineum. The perineum is that part of the human body considered to be the floor of the abdomen, enclosed by a line beginning on the anterior surface at a point in the midline of the symphysis pubis and extending laterally on both sides to the ischial tuberosities and posteriorly to the tip of the coccyx (fig. 7).

Upper Extremity. The upper extremity is that part of the human body enclosed superiorly by a line beginning on the anterior

surface at the junction of the lateral and middle thirds of the clavicle, sloping downward, laterally, and inferior to the coracoid process of the scapula to the anterior axillary line at its origin. The upper extremity is enclosed inferiorly by a line beginning on the posterior surface at the junction of the lateral and middle thirds of the clavicle, extending posteriorly over the spine of the scapula to the origin of the posterior axillary line and across the axilla to the anterior axillary line.

Shoulder. The shoulder is that part of the human body enclosed superiorly by a line beginning on the anterior surface at the junction of the lateral and middle thirds of the clavicle, sloping downward and laterally to the origin of the anterior axillary line, below the head of the humerus and across the rounded contour of the deltoid muscle to the origin of the posterior axillary line, then upward across the spine of the scapula to a point on the surface at the junction of the lateral and middle thirds of the clavicle.

Lower Extremity. The lower extremity is that part of the human body enclosed by a line beginning on the surface anteriorly at the pubic tubercle, extending upward and laterally to the anterior superior iliac spine, over the crest of the ilium, posteriorly to the base of the sacrum, downward to the tip of the coccyx, inferiorly over the tuberosity of the ischium and anteriorly to the middle of the symphysis pubis.

Hip. The hip is that part of the human body enclosed by a line beginning on the surface anteriorly at a point in the middle of the symphysis pubis and extending laterally to the anterior iliac spine and the tubercle at the summit of the iliac crest, then downward and posteriorly to the lateral entrance of the gluteal fold superficial to the inferior border of the greater trochanter of the femur, then anteriorly around the head of the femur to the middle of the symphysis pubis.

Buttock. The buttock is that part of the human body enclosed by a line beginning on the surface posteriorly at the tip of the coccyx extending upward to the base of the sacrum in the midline and curving laterally to the prominent tubercle at the summit of the iliac crest, then downward to the lateral entrance of the gluteal fold and medially over the tuberosity of the ischium to the tip of the coccyx.

SUBDIVISIONS OF BODY AREAS

Surface demarcation accounts for the principal anatomic regions; namely, head, face, neck, thorax, abdomen, upper extremity, and lower extremity. The shoulder, perineum, hip, and buttocks are considered to be principal areas within these regions.

The shoulder is a part of the upper extremity; the perineum is the floor of the abdomen; the hip and buttock a part of the lower extremity. These areas have been defined as clearly as possible because experience has shown that identification of these particular boundaries usually suffers from variable interpretation. Objection may be made to the use of these terms and areas at all, but it has been found that accountability for them in statistical tabulation is mandatory because of traditional usage, and, indeed, such recording is of some specific clinical value. Exact localization of boundaries for these areas should remove any objection to their usage, because the most important factor for present consideration is actually the establishment of a common standard. Accuracy in medical reporting can then, and only then, be obtained.

It is readily noted that all of the landmarks used in plotting the anatomic regions and areas are not always truly those of surface topography. The human body simply does not lend itself to such consistency; therefore, reference to the skeletal system has been indicated wherever more convenient. It is believed that one can apply the proposed boundaries with greater ease if both surface and skeletal landmarks are visualized.

It is also desirable to obtain uniformity through a system of subdivision of all the principal anatomic regions. The following plan, based on simplicity and ease of application, is proposed:

The entire human body can be subdivided into right and left halves by a median plane utilizing the mental protuberance and symphysis pubis as focal points anteriorly, and the external occipital protuberance and tip of the coccyx posteriorly. The principal regions can then be subdivided into quadrants by successive transverse planes at levels of the inferior border of the nose, the spinous process of the fourth cervical vertebra, the nipples, and the umbilicus. The lateral areas of the body are identified by a parallel downward extension of the anterior and posterior axillary lines. Subdivisions of the head are easily formed by use of its natural boundaries into frontal, temporal, mastoid, parietal, and occipital areas. Likewise, the face can be divided into nasal, orbital, maxillary, and mandibular areas. The neck is subdivided on each side into an anterior and posterior half by the natural boundary of the sternocleidomastoid muscle. The perineum is subdivided into an anterior and posterior half by a line connecting the two ischial tuberosities.

Subdivisions of the extremities offer little confusion if the shoulder, hip, and buttock are clearly defined. Occasionally there is incorrect reference to the arm as an inclusive term for

the upper extremity, rather than a distinct recognition of the forearm as a separate anatomic area. The upper extremity is subdivided into the following natural areas: shoulder, arm, elbow, forearm, and hand; the lower extremity into the hip, buttock, thigh, knee, leg, and foot. Long bones are further subdivided into proximal, middle, and distal thirds. The joints have obvious boundaries, but may require roentgenographic examination for exact information. The wrist and ankle are somewhat vague in definition, but for practical purposes offer small chance for error. Reference to the antecubital or popliteal fossae should include a statement as to position, superior or inferior. Fingers and toes should receive exact designation, rather than loose notation as hand or foot.

TERMS OF POSITION AND DIRECTION

The most common terminology appears to be as follows:

1. Median plane. A vertical anteroposterior plane passing through the center of the trunk, dividing the body into right and left halves.

2. Sagittal plane. Any plane parallel to the median plane.

3. Coronal plane. A vertical plane at right angles to the median plane; also known as a frontal plane, dividing the body into anterior and posterior parts.

4. Transverse plane. A plane at right angles to both the median and coronal planes, dividing the body into relative levels.

5. Terms of position and direction. (a) *Anterior,* ventral, front; (b) *Posterior,* dorsal, back; (c) *Superior,* cephalic, above, upper; (d) *Inferior,* caudal, below, lower; (e) *Medial,* nearer to and (f) *Lateral,* farther from the median plane; (g) *Superficial,* nearer to and (h) *Deep,* farther from the surface; (i) *External,* outermost and (j) *Internal,* innermost part of cavity wall or hollow viscera; (k) *Proximal,* that part of a limb nearer to and (l) *Distal,* that part of a limb farther from the attached end.

SUMMARY

Exact localization of missile hits, through demarcation of body regions, is essential for designing body armor and for giving statistical value to medical data on battle casualties.

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THE TREATMENT OF VARICOSE VEINS DURING PREGNANCY

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A STRONG prejudice against the active surgical treatment of varicose veins in the pregnant woman has existed since the time of Ambrose Paré. The therapy outlined by standard obstetrical texts is conservative.[1,2] Definitive surgery is objected to because of the belief that the varicosities will disappear after delivery and because treatment during pregnancy is considered to be completely ineffective. This is far from the truth. Many of the varicosities appearing during pregnancy remain after delivery and continue to be symptomatic. Several reports have recently appeared presenting series of patients treated surgically during pregnancy with excellent and lasting results.[3-5]

Extensive surgical procedures for the cure of patients with varicose veins can be conducted during pregnancy with complete safety for the mother and child. The young mother who is incapacitated because of pain, edema, and fatigue is rapidly able to assume full control of her household and presents a most gratifying postoperative result.

The most urgent indication for surgical therapy is the prevention of intravascular thromboses and pulmonary emboli. In the past two decades there has been a marked lowering of the maternal mortality caused by sepsis, toxemia, and hemorrhage; as a result, pulmonary emboli have become more prominent statistically. Collins[6] pointed out that a review of any large series of patients, either gynecologic or obstetric, shows that anywhere from 10 to 20 percent of the deaths are due to pulmonary emboli. Varicose veins of the lower extremities are one of the more important predisposing factors in thrombo-embolic disease, and hence active surgical treatment becomes a necessary prophylactic measure.

Quattlebaum and Hodgson[3] studied 600 consecutive obstetric patients and found 11 percent to have significant varicose veins. Of the 52 patients with varicose veins treated conservatively,

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21 developed subsequent thrombophlebitis, and two patients demonstrated nonfatal pulmonary emboli Of the 14 patients treated surgically, only one developed thrombophlebitis and none developed pulmonary emboli.

PATHOPHYSIOLOGY

Pregnancy adds several factors to the development of varicose veins in the susceptible person. The enlarging uterus increases intra-abdominal pressure and occludes the large venous trunks of the abdomen and pelvis, causing an increase in hydrostatic pressure in the veins of the lower extremities. Adams[7] has stressed the importance of the sump action of the right heart in decreasing the gravitational pressure of the column of blood on the veins of the extremities. The increased intra-abdominal pressure of pregnancy interrupts the column of blood in the abdomen and diminishes the sump effect. It is well known that the standing pressure in the superficial lower limb veins is the same before and after ligation. As Adams pointed out, the most significant result of ligation is cessation of the marked increase in pressure following straining or coughing.

Veal and Hussey,[8] in measuring the popliteal venous pressure during pregnancy, found readings above normal, but the increase was greater in those patients with varicose veins. His most significant finding was a noticeable unilateral increase in venous pressure in patients with unilateral varicose veins. Other factors proposed as explanations for varicosities in pregnancy are the competition for common iliac emptying by increased flow from the internal iliac vein and the theoretic arteriovenous shunt action at the placental site.

INDICATIONS

Very few antepartum patients will require surgical therapy. There is no question that the great majority of the dilated veins found during pregnancy will resume their normal caliber following delivery. Patients with extensive symptomatic varicosities should be evaluated for treatment in the same manner as the nonpregnant patient. The adequacy of the deep circulation and competence of the valves is ascertained by the usual tests. A list of indications for surgical treatment that has proved most satisfactory is a modification of the one advanced by Peyton and Loop,[4] and includes (1) pre-existing varicosities, (2) incapacitating vulvar varicosities, (3) history of thrombophlebitis, (4) advent of thrombophlebitis, or (5) marked subjective manifestations and demonstrable incompetence of the saphenous system.

At this hospital symptomatic varicosities present prior to pregnancy are an essential prerequisite for surgical treatment.

TREATMENT

The patient is admitted to the hospital the afternoon prior to operation, and the location of the major varicosities and "blow outs" is mapped on the skin with an indelible marking solution, such as brilliant green. At operation, anesthetics such as thiopental sodium (sodium pentothal), nitrous oxide, and oxygen anesthesia have proved most satisfactory. A careful high ligation with identification and division of all the tributaries up to the sapheno-femoral junction is performed. To this is added retrograde intraluminal stripping, extraluminal stripping, and segmental resections as indicated by the individual case. A padded pressure dressing is applied and the lower extremities are elevated on pillows for eight hours. The patient is ambulated the evening of operation and discharged from the hospital in 24 to 48 hours. She is seen in one week for removal of sutures, and then at intervals of two months. Compressive bandages are advised throughout the pregnancy, labor, and immediate postpartum period because of the susceptibility to thrombophlebitis.

TABLE 1. *Summary of cases*

Case number	Age	Duration of pregnancy (months)	Duration of symptoms (years)	Treatment
1	19	7	2	Right high ligation, stripping, left multiple resections
2	28	5	5	Right high ligation, stripping, multiple segmental resections
3	23	4	6	Right high ligation, multiple resections
4	42	5	8	Left high ligation, stripping
5	29	4	7	Bilateral high ligation, multiple segmental resections
5	29	7	7	Bilateral multiple segmental resections
6	19	4	2	Ligation of major veins of labia
7	18	6	1	Right high ligation, multiple segmental resections

RESULTS

In the past two years, seven patients with severe varicose veins have been selected from the antepartum clinic of this hospital for surgical therapy (table 1). The patients ranged in age from 19 to 42 years, and the duration of pregnancy varied from the fourth to seventh month. The patients all demonstrated pro-

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nounced varicosities with disabling symptoms and dated the onset of their disease from one to eight years preceding the onset of pregnancy. Six of the seven patients experienced almost immediate and complete relief from symptoms and demonstrated almost complete clearing of the varicosities. The remaining patient (case number 5), a 29-year-old para 2 gravida 3 with marked bilateral varicosities, was operated upon in the fourth month of pregnancy, and a bilateral high ligation with multiple segmental resections was performed. The patient was improved but continued to have distressing symptoms. Follow-up examination revealed several enlarged residual peripheral and labial varicosities. She was readmitted to the hospital during the seventh month of pregnancy and multiple segmental resections were performed with improvement but not complete relief of symptoms. One patient (case number 6) had experienced a spontaneous rupture of labial varicosities in the fourth month of a previous pregnancy. Pronounced symptoms of labial varicosities recurred in the fourth month of the current pregnancy and a ligation was performed with excellent results. There were no complications of any type encountered and no question of inducement of labor with the procedure.

SUMMARY

Pregnancy is not a contraindication to the surgical treatment of varicose veins. The relief of symptoms obtained in patients incapacitated by varicose veins during pregnancy by surgical treatment is most gratifying. The elimination of varicose veins is an important prophylactic measure in the prevention of thrombo-embolic disease. High ligation and vein stripping appears to be the most successful surgical approach.

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USE OF PHENYLINDANEDIONE IN ACUTE THROMBOEMBOLIC DISEASE

Observations in 35 Patients

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THE physiologic mechanism of blood clotting was first described in 1904 by Morawitz[1] and by Fuld and Spire.[2] A variety of accessory factors and reactions in the blood clotting mechanism have been noted since that time.[3,4] According to Quick,[5,6] blood clotting is an autocatalytic cycle in which four reactions are involved, and all of the factors essential to the process, namely, thromboplastinoginase, thromboplastinogen, calcium, prothrombin, AC-globulin[7] (labile factor, factor V[8]), serum prothrombin conversion accelerator (SPCA),[9,10] and fibrinogen, are to be found in the blood plasma.

The existence of substances which delay the clotting of the blood, either *in vitro* or *in vivo,* has been known for a number of years. One of these, heparin sodium, was discovered by McLean[11] in 1916. The action of heparin sodium is believed to be due to its effect on thrombin. The simplest method for estimation of the anticoagulant potency of heparin sodium depends upon the clotting time of whole blood, determined most commonly by the three-tube, Lee-White modification of Howell's test for clotting time.[12] An adequate "heparin" effect is considered to be a coagulation time of 30 to 45 minutes as compared with a normal coagulation time of nine to 15 minutes by the Lee-White method.

If heparin sodium were effective orally it would be considered an essentially ideal anticoagulant; but because of the need for frequent injections when it is used an orally effective anticoagulant would be preferable.

Research on hemorrhagic "spoiled sweet clover disease" in cattle, a disease characterized by hemorrhage with signs of hypoprothrombinemia, led to the discovery of bishydroxycoumarin (dicumarol) about 1940. This compound and several chemically related substances (coumarin derivatives) have subsequently

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been used as anticoagulant drugs. A brief summary of the characteristics of coumarin derivatives, based on a review of several references, is presented herewith.[13-15]

Bishydroxycoumarin.

1. Requires 48 to 72 hours to produce an optimal effect.

2. Effect persists four to seven days or more after discontinuance of therapy.

3. Daily prothrombin time test required.

4. Cumulative effects noted.

5. Initial dose, 300 to 400 mg.

6. Maintenance dose, 100 to 200 mg.

Ethyl biscoumacetate (tromexan ethyl acetate).

1. Optimal effect of therapy in 18 to 24 hours.

2. Effect persists 24 to 48 hours after withdrawal of drug.

3. Daily prothrombin time test required until maintenance dose is established; thereafter, on alternate days or once or twice weekly.

4. Reduced cumulative effects noted.

5. Initial dose, 1500 to 1800 mg.

6. Maintenance dose, 600 to 900 mg. (Regulation of dosage may be difficult. Tulloch and Gilchrist[14] found that individual requirements for ethyl biscoumacetate vary considerably, and the response to the drug may fluctuate through a wide range from day to day in the same patients.)

Cyclocumarol (cumopyran).

1. Requires 24 to 36 hours to develop optimal effect.

2. Effect persists seven to 10 days or longer after therapy is discontinued.

3. Cumulative action.

4. Initial dose, 200 to 300 mg.

5. Maintenance dose, 100 to 200 mg.

Reporting on the three above-mentioned drugs in 1952, Barker and associates[15] concluded that: (1) Ethyl biscoumacetate is the most rapid in its action, and its effect disappears most quickly when the drug is discontinued. (2) These potential advantages are offset to some degree by greater difficulty in maintaining the prothrombin time within the therapeutic range, particularly during the first two weeks of treatment. (3) Cyclo-

cumarol produces a somewhat more consistent hypoprothrombinemia with less tendency to daily fluctuations, but the hypoprothrombinemia tends to persist for a long time after the drug is discontinued. (4) All three drugs are equally effective in preventing thrombosis but are attended by some risk of bleeding.

In 1943, studies by Kabat and associates,[16] relating to the toxicity of certain compounds, led to the observation that a number of indanedione derivatives given orally were capable of inducing hypoprothrombinemia in laboratory animals.

Several groups of investigators[17-23] have studied the effect of phenylindanedione (phenindione, hedulin). Both laboratory and clinical research[24] indicate that this drug has a rapid prothrombinopenic action, a low order of toxicity, and lack of effect on the concentration of factor V.

This article presents a clinical report on the use of phenylindanedione in 35 patients with acute thromboembolic diseases.

MATERIAL AND METHODS OF STUDY

The types of acute thromboembolic disease affecting the 32 male and three female patients in this series were thrombophlebitis (14 patients), pulmonary infarction (two patients), myocardial infarction (17 patients), and auricular fibrillation (two patients).

The diagnoses were confirmed clinically and electrocardiographically. No selection of cases was attempted; only consecutive admissions were studied. The average age of the patients was 49 years, ranging from 22 to 74 years. Before therapy was begun, all patients were examined, their general physicial condition evaluated, the presence or absence of hepatomegaly noted, and their weight obtained. Employing a commercial thromboplastin (simplastin), daily prothrombin times were determined by the modified one-stage method of Quick,[25,26] and were expressed in terms of percentage of normal prothrombin activity. Therapeutic control was considered acceptable between the range of 10 and 30 percent of normal. In this series of cases prothrombin levels were maintained in the range of 10 to 20 percent of normal in one group of nine patients (herein arbitrarily called "relatively strong response group") and between 20 to 30 percent in 26 patients (arbitrarily called "moderate response group").

Blood for an initial prothrombin determination was drawn before institution of treatment. Following completion of anticoagulant therapy, prothrombin determinations were obtained until values again reached normal levels. From these data, the "recovery period" (time required for prothrombin activity to reach 40 per-

cent or above)[27] was determined. The incidence of "prothrombin escape" under treatment was also estimated, because it was assumed that an elevation of prothrombin time above the 30 percent level indicated inadequate anticoagulant protection.

Phenylindanedione was made available in centrally-scored 50 mg. tablets which could be broken into 25-mg. portions when necessary. Laboratory and clinical experience demonstrated the desirability of administration of this drug in tablet form every 12 hours. This schedule produced a more rapid onset of therapeutic effect than a single dose at 24-hour intervals. It also facilitated estimation of the maintenance dose which in most cases remained constant throughout the period of therapy.

Frequent urinalyses, erythrocyte sedimentation rates, and complete blood counts were done in all cases. Multiple liver function tests (serum protein, albumin-globulin ratio, bromsulphalein and thymol turbidity) were performed in 10 patients, after institution of treatment.

The routine management for all cases of myocardial infarction consisted of morphine at the onset for relief of distress, bed rest for four weeks, then graduated exercise.

RESULTS

Dosage. Oral doses of 200 to 300 mg. of phenylindanedione were given initially. Those patients weighing 150 pounds or less were given 200 mg. and those weighing over 150 pounds received 300 mg.; these were given in divided doses of 100 or 150 mg. each at 0900 and 2100 hours.

Frequency of Administration. As in other anticoagulant therapy (bishydroxycoumarin, ethyl biscoumacetate, et cetera), the maintenance dose must be gaged by the prothrombin time tested daily for at least the first four to seven days of therapy. Once the maintenance dosage is established, less frequent prothrombin determinations are necessary, depending on the individual reaction of each patient.

The average daily maintenance dosage was found to be 150 mg. in the group receiving relative strong response (nine cases) and 100 mg. daily in the group receiving moderate response (26 cases). The total amount of the drug administered to any one patient in this series ranged from 675 to 4,775 mg. Duration of therapy was from nine to 80 days. Maintenance dosage fluctuated in individual cases from 25 to 300 mg. daily.

Figure 1 represents data from a patient with pulmonary infarction who was maintained on prothrombin levels of 10 to 20 percent of normal. Figure 2 is based on data from a patient with

a diagnosis of anterior myocardial infarction, well-controlled on phenylindanedione, with levels between 20 and 30 percent of normal.

Speed of Action and Recovery. Thirty-four patients in this small series of 35 responded to phenylindanedione with therapeu-

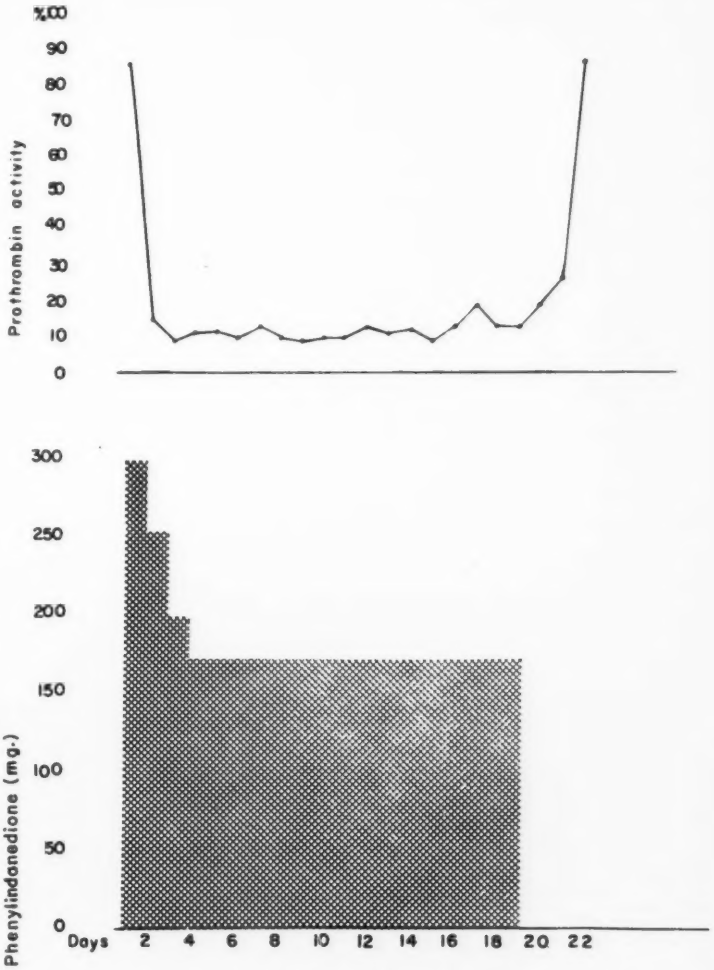

Figure 1. Prothrombin activity as related to phenylindanedione administration in a patient with pulmonary infarction, well-controlled on divided daily doses of phenylindanedione (prothrombin activity between 10 and 20 percent of normal).

tic effect on their "prothrombin time." This occurred in 12 hours in three patients, 24 hours in 18, 36 hours in four, and 48 hours in nine patients. The average time necessary to achieve a therapeutic effect was 28 hours.

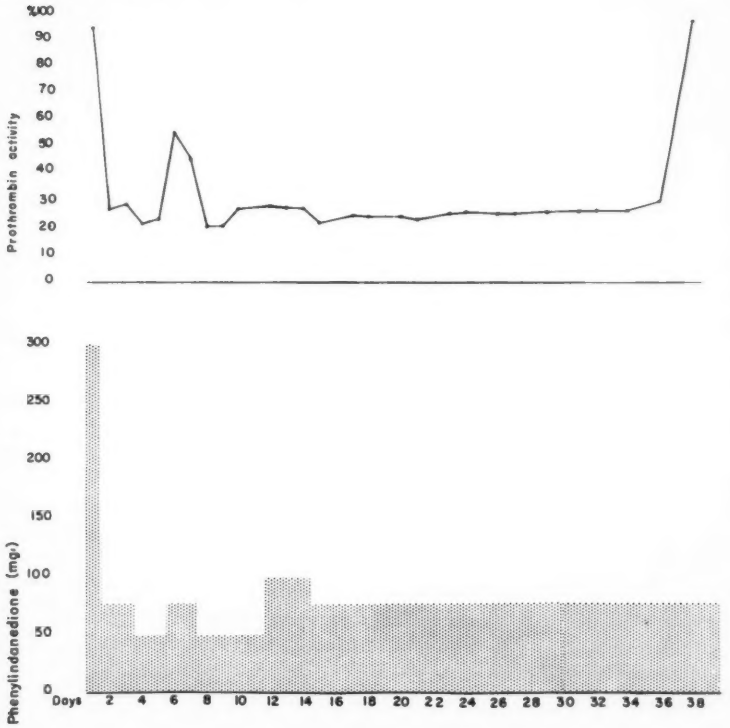

Figure 2. Prothrombin activity of a patient with anterior myocardial infarction, well-controlled on divided daily doses of phenylindanedione (prothrombin activity between 20 and 30 percent of normal).

Prothrombin escape (above 30 percent activity) while under treatment occurred in eight patients (23 percent of this series). This indicates that adequate "protection" was not maintained by the dosage employed. When the daily dosage was increased by an additional 25 to 150 mg., "escape" was mitigated and the prothrombin time promptly fell to therapeutic levels in 24 to 48 hours. In three other patients on "average" dosage of phenylindanedione, very low prothrombin times (less than 10 percent of normal) were obtained. This was promptly corrected and the hazards of hemorrhage averted by the simple expedient of omitting the anticoagulant for the next day or two.

The recovery rate of prothrombin time after discontinuance of phenylindanedione in 21 patients (60 percent) was 48 hours or less. The remainder, with the exception of two patients on whom information is not available, showed complete recovery in 60 to 112 hours. The prothrombin time rapidly approached normal within one to three days before it actually returned to pretreatment levels. Recovery rate of prothrombin time is presented in table 1. The average recovery rate was 47 hours.

TABLE 1. *Time for return of prothrombin level to normal after discontinuance of phenylindanedione*

Time (hours)	Patients	
	"Strong response" group	"Moderate response" group
0-24		11
24-36	1	2
36-48	1	6
48-60	2	1
60-72	2	3
72-84	1	1
84-96	1	
96-112	1	

Individual Reaction and Toxicity. Undesirable side effects, consisting of scarlatiniform rashes, polydipsia, polyuria, and tachycardia previously described by others,[17, 23, 27] were not observed in this small series. No hemorrhagic episodes occurred among the 35 patients treated. A transient proteinuria, read as "trace" of albumin, was noted in three patients. This phenomenon occurred within the first few days of treatment and disappeared in every instance within several days while the medication was still being continued. Microscopic examination of urine was reported as negative, although some patients developed an orange-red urine for a few days early in the course of treatment. There were no demonstrable changes in erythrocyte sedimentation rate, red blood cell count, white blood cell count, and the differential count due to this drug. Tests of liver function in 10 cases were found to remain normal before and after the institution of treatment.

Resistance to Phenylindanedione. Some patients treated with bishydroxycoumarin or with other injectable coumarin derivatives have manifested resistance to those anticoagulants: initial resistance, in which adequate hypoprothrombinemia is never ob-

tained; and delayed resistance, in which the patient may respond well to the drug and then, suddenly, despite increasing doses of the drug, the prothrombin time returns to normal. Observations reported by other workers[28] had indicated that there was no specific resistance to phenylindanedione by mouth.

A 41-year-old, 175-pound man, treated for myocardial infarction, was found to be resistant to phenylindanedione. The patient responded to the drug, however, after the administration of phenylindanedione and bishydroxycoumarin was combined. He was given 2,050 mg. of phenylindanedione over an 11-day period. The prothrombin time was never prolonged beyond 17 seconds, compared to a control of 13 seconds. As illustrated in figure 3, his prothrombin activity between the sixth and eleventh days inclusively reflects his resistance to increasing doses of the drug. He was then placed on 200 mg. of bishydroxycoumarin daily for the twelfth and thirteenth days, but there was virtually no change in prothrombin time. From the fourteenth to the seventeenth day the patient was placed on the combined administration of 50 mg. each of phenylindanedione and bishydroxycoumarin twice a day. On the sixteenth day the patient showed 26 percent of normal prothrombin activity. Bishydroxycoumarin was discontinued on the seventeenth day, and subsequently (from the eighteenth through the twenty-second days) the patient was maintained at therapeutic prothrombin levels on phenylindanedione alone.

Effect of Vitamin K on Phenylindanedione. It has been reported[23, 24, 29] that vitamin K (water-soluble) and vitamin K emulsion are efficacious as antagonists to phenylindanedione when given intravenously. The opportunity to study the antagonistic action of vitamin K did not present itself because there was no case of hemorrhage in this series.

Aureomycin, chloramphenicol, and oxytetracycline (terramycin) may induce a marked prolongation of prothrombin time. The production of vitamin K is largely dependent on the action of the bacterial flora of the intestinal tract. When the bacterial flora are killed off or greatly disturbed by the oral antibiotics, the production of vitamin K may sharply diminish. In such patients small doses of anticoagulants may cause a precipitous fall in prothrombin times. Because of this occult but nevertheless real danger no patients in this series received antibiotic therapy while under treatment with phenylindanedione.

One death due to myocardial infarction, probably from extension of the thrombus, occurred while the patient was under effective anticoagulant therapy. There was one episode of migrating thrombosis in a patient whose prothrombin determinations were maintained at therapeutic levels by daily doses of phenylindanedione. The diagnosis was pancreatic carcinoma

with hepatic metastases. Although his prothrombin time responded well to 50 mg. of oral anticoagulant daily, the clinical course rapidly deteriorated and he developed terminal phlebitis. The

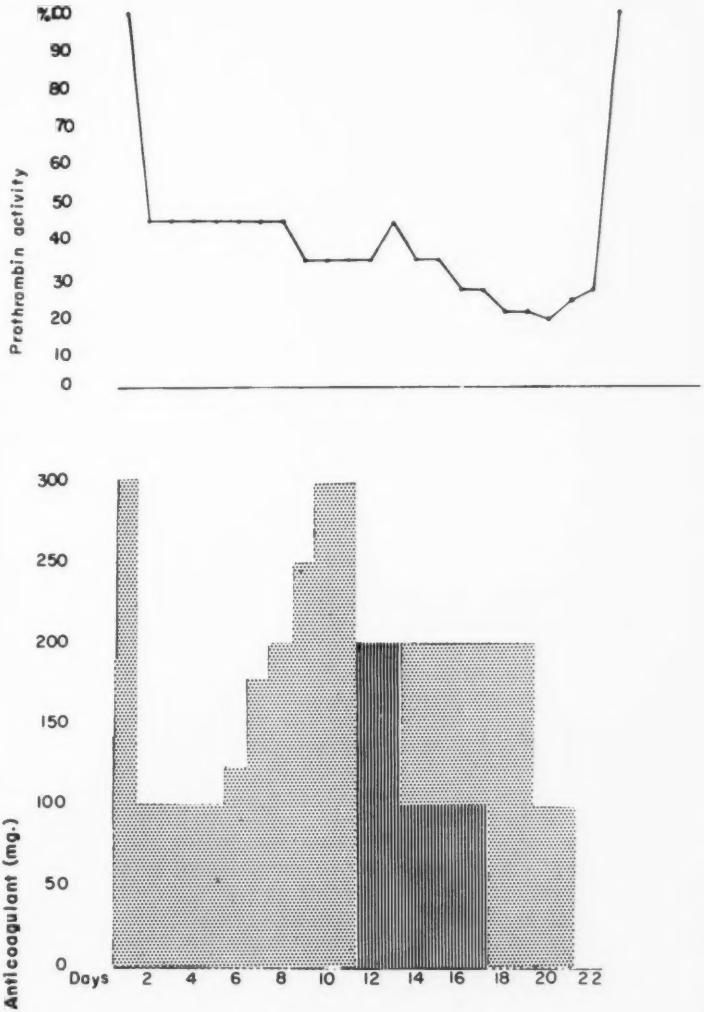

Figure 3. Prothrombin activity as related to administration of phenylindanedione and bishydroxycoumarin, separately and together, in patient with myocardial infarction. Dotted areas represent therapy with phenylindanedione, and vertically hatched area with bishydroxycoumarin.

apparent failure of anticoagulant therapy to prevent thromboembolic disease in this particular instance may be associated with the release of an excessive amount of thromboplastin due to destruction of tissue cells by malignant invasion.

DISCUSSION

Studies of the beneficial effects of anticoagulant drugs in the treatment of thromboembolic diseases have stimulated a search for an "ideal" agent. Such a drug should be nontoxic, possess rapid onset of therapeutic effect and a shorter duration of action, require a constant maintenance dosage, and result in a prompt recovery after discontinuation of the drug. No one anticoagulant to date meets these ideal criteria. However, phenylindanedione may be considered a rapidly-acting prothrombinopenic agent. Therapeutic depletion of prothrombin activity was obtained in 12 to 48 hours after an initial dose of 200 or 300 mg. by mouth, depending on body weight. The effect of phenylindanedione usually persisted from 24 to 96 hours, in relation to the dosage employed.

SUMMARY

Phenylindanedione was administered by mouth for periods of nine to 80 days in 35 patients with acute thromboembolic diseases in order to produce and maintain a hypoprothrombinemia. The initial dosage was 200 to 300 mg., according to the weight of the patient. An average daily dose of 110 mg. maintained the blood prothrombin activity between 10 and 30 percent of normal in this series. An additional 50 mg. of phenylindanedione daily reduced prothrombin activity to 10 or 20 percent of normal. Prothrombin escape was controlled by increasing the daily dosage of phenylindanedione, whereas unduly low prothrombin values were corrected by omission of the drug for one or two days. One patient resistant to phenylindanedione responded to combined bishydroxycoumarin and phenylindanedione therapy.

Ten patients in the series were investigated for possible impairment of liver or kidney function and no evidence for such a complication of the anticoagulant therapy was found. In the entire series of 35 patients, no hemorrhagic manifestation was observed. One death occurred among the 17 patients with myocardial infarction while anticoagulant drugs were being administered.

CONCLUSIONS

Phenylindanedione possesses more rapid action and far less cumulative effect than bishydroxycoumarin. Its judicious administration is attended by little or no toxicity. While the total number of cases reported herein is too small to warrant statis-

tical analysis, it appears that in proper dosage by mouth phenylindanedione induces a therapeutic degree of hypoprothrombinemia and thus aids in the management of thromboembolic disease.

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BARBITURATE OVERDOSAGE AND POISONING

In contemporary society, barbiturate overdosage and poisoning is a pressing problem facing the medical profession. The problem, considered in its totality, is one exceedingly difficult to solve and the current fear is that the dilemma will grow more acute with the increasing use and misuse of barbiturate drugs. Indeed, the problem, with its many facets, is not only concerned with the actual ingestion of toxic-to-lethal amounts and therapy of the resultant coma. It is a problem involving the ability of lay persons to obtain these drugs with comparative ease, often without a prescription from a qualified physician and hence outside the realm of close therapeutic control. Also to be considered is the ease of the suicide attempt, the availability of these drugs to young children with their lack of judgment, and to old persons with organic mental disease and memory defect. In the psychiatric field there is the problem of the prevention of recurrent suicidal effort and the management of the frequent neurotic and psychotic exacerbations which precipitate the act of overdosage.* * * One reads too often in daily papers of the victims of acute barbiturism, and although deaths from suicides are less frequent, they still number 11.5 per 100,000. The alarming fact is that the proportion of suicides due to the barbiturates is not merely on the increase but that the increase has reached astounding proportions.

—THEODORE B. KROUSE, M. D.
in *Pennsylvania Medical Journal,*
p. 638, July 1954

THE FUTURE OF MILITARY MEDICINE

BRIGADIER J. N. B. CRAWFORD, *M. B. E., E. D., RCAMC*

AT this time the Royal Canadian Army Medical Corps is looking back on 50 years of achievement. Many doctors in Canada have contributed to the accomplishments of the past and this may be an appropriate time to give some thought to military medicine of the future.

At the outset, it may be well to consider what is meant by the term "military medicine," and it will be helpful to recall the stated tasks of the medical service of the Army: to maintain the health of troops in the field, to collect and transport sick and wounded, to maintain medical records, to maintain medical supplies, to treat the sick and wounded. The order in which these tasks are listed may be accidental. They are mutually interdependent and the successful accomplishment of any one depends upon the efficient performance of the others. Military medicine is that mixture of doctoring and administration which enables a doctor to accomplish these tasks. The individual medical officer may specialize in one or another of these functions, but the success of the medical service as a whole depends upon the complete integration of all of them.

The conscientious medical practitioner in civilian life looks upon his patient as an individual. The diagnostic aids which the doctor employs, the drugs which he uses in treatment and the length of time of convalescence are governed to some extent by the economic status of the patient, and the surgical equipment which the doctor uses is chosen largely in accordance with his individual preferences. The military doctor, while retaining his concern for the patient as an individual, finds this attitude modified somewhat by the fact that his patient is a cog in a fighting machine who must be returned to fight again as quickly as possible or, if he is so severely injured that he cannot fight again, he must be evacuated from the fighting area. The civilian medical practitioner who dons a uniform in service of his country in time of emergency finds that his individual preferences in the choice of surgical equipment must be limited to the over-all problem of supply in a theater of war. When he complains that

From Canadian Forces Medical Council, Department of National Defence, Ottawa, Ontario.

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a patient in whom he is particularly interested, and whose case he wishes to follow to completion, is transferred away from his control, he may have failed to appreciate that a tactical situation is developing which will shortly produce a heavy patient load and require every bed which can be made available in his particular hospital.

In other words, the civilian doctor works essentially as an individual and develops a very personal relationship with his patient. The military doctor must learn to work as a well-trained member of a large and somewhat impersonal team, while at the same time gaining the confidence of his patient during the period of his personal contact with him.

While the sphere of treatment of patients is doubtless the most satisfying to the soul of every doctor, the provision of competent treatment personnel is not the most pressing problem for the medical services of the armed forces in time of war. Always in past emergencies there have been, and undoubtedly in the future there will be sufficient competent doctors who will flock to the colours to play this treatment role. This service will not be entirely without gain to them. Under conditions of war and in a relatively short period a wealth of clinical experience is offered which could be gained in no other way. It is not surprising that under the circumstances of war technical advances in treatment are made which are reflected to the benefit of the entire medical profession.

The problem of provision of adequate treatment of the sick and wounded in time of war is great, but equally important are the problems of organization and administration of medical services: how to ensure that doctors are provided for the armed forces without crippling the medical care of civilians remaining on the home front; how to ensure that doctors in the armed forces are employed with the utmost economy and in accordance with their special abilities; how to keep troops free of those diseases which are endemic in a theater of operations or which may be introduced deliberately by the enemy; how to maintain troops in a state of utmost fighting efficiency under the conditions prevailing in the ships, aircraft or vehicles in use and with the equipment which they carry; how best to collect the wounded from a field of battle and transport them quickly to treatment; how to supply the best possible in medical equipment, instruments and drugs to the places in which they are required, and how to maintain this supply under operational conditions, all the while relating this requirement to the potential of the manufacturers and to the system of supply in allied forces; and, finally, how to give guidance to the medical profession as a whole in those fields which are not covered in ordinary civilian practice, for

example, the problems of flight at high altitudes and great speed, of human behaviour under conditions of extreme cold, of the treatment of casualties produced by such special weapons as the atomic bomb or poison gases, and of treatment of casualties in the mass as opposed to the treatment of the individual.

These problems face the military doctor, and their solution demands much study and training of a very special kind. Moreover, this study and training must be going on constantly in time of peace in preparation for the possibility of war. It is not sufficient to rely upon native ingenuity to produce a suitable solution to these problems when an emergency is upon us. Thus, there is a very definite requirement for the doctor who is prepared to study these problems constantly; in short, who is willing to make a career of military medicine.

Such a career offers a great variety of interest, as can be gathered from what has been written above, and yet a career in military medicine does not appear to be popular among Canadians. Canada is unique among nations in that military service is entirely voluntary. No one is forced by law to spend any time in the armed forces and this applies equally to the medical services of the armed forces. This is a matter of governmental policy and it is not proposed to discuss its virtues or defects; but lacking universal military service, military medicine must attract young doctors through its own merits.

Why a career in military medicine has not made a greater appeal to the young Canadian doctor has been a matter of grave concern and serious study in the armed forces and should equally be a matter of concern to the entire medical profession of Canada.

Does the lack of interest of the young doctor in a career in the armed forces indicate that the military doctor does not receive sufficient pay? This has been advanced as one explanation for the situation and it is true that the average pay of medical officers in the armed forces does not equal the average pay of all Canadian doctors as shown in the returns from the Dominion Bureau of Statistics. The young doctor enters the Army in the rank of captain, or an equivalent rank in the Air Force or Navy, and if he is married he will start with a take-home pay of about $5,300 a year after pension payments and income tax have been deducted. He can look forward with some certainty to promotion to the rank of major and this may occur fairly quickly. The starting pay, after all deductions, for a married major is in the order of $6,000 a year, and this is subject to automatic periodic increases. Thus, while the service medical officer cannot expect to sit in the lap of luxury, neither is he a candidate for the relief rolls. The discrepancy between the pay of the service medical officer and the civilian practitioner of similar medical

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experience is, to some extent, offset by the freedom from the worries of running his own business, generous periods of annual leave, a very good pension plan and a general sense of financial security which the military doctor enjoys.

Does the lack of interest of the young doctor in a career in the armed forces represent an attitude on his part that he cannot practise "good medicine" in the services? One cannot deny that in a time of real peace in an army made up of young men selected on the basis of physique, there are few wounded and only little in the way of sickness requiring treatment. In time of war, of course, there are more than ample opportunities for excellent clinical work and many have gained clinical experience which could never be acquired in civilian life. Even in time of peace the services have made a very sincere attempt to improve the opportunities for good clinical practice. Wherever military hospitals are situated they are equipped with the very best in the way of apparatus, instruments and drugs. The medical officer is under no necessity to consider the economic status of his patient, nor need he feel that the patient must be returned to work before adequate convalescence has been completed. He has complete freedom to call in specialist consultants, either service or civilian, whenever he feels such services are required, and this is limited only by the geographical location of such consultants. In service communities which are more or less isolated in Northern Canada, the service medical officer provides complete treatment, not only to the serviceman but to the dependents of servicemen and in these locations medical practice of the most comprehensive order is carried on by the service medical officer.

The services have been remarkably successful since the end of World War II in implementing a programme of postgraduate education of the medical officers. Present regulations permit a medical officer of the regular services to spend one year in each five year block of service in a type of activity which can be counted toward specialist qualification. The success of this programme is measured by the very considerable number of service medical officers who hold specialist qualifications, certificate or fellowship, from the Royal College, which they have obtained under service auspices.

The Canadian Forces Medical Council is particularly interested in the question of professional advancement of medical officers. It is felt that a good deal can be done to increase the professional interest in the medical services by adopting a policy of free interchange of professional personnel between hospitals operated by the three medical services. Such policy has been adopted and a start has already been made on putting it into practice.

Does the lack of interest of the young doctor in a career in the armed forces indicate his unwillingness to adopt a way of life which he feels does not permit him and his family to settle down in any one spot? To some people this nomadic form of existence is not unattractive; to others it represents a very real disadvantage. It is true that in the past the service doctor has been moved from place to place far too frequently. This has been necessitated by the commitments undertaken by Canada on three continents. It has been necessary to move doctors to the spots of greatest need. It is reasonable to suppose that, as the numbers of available medical officers increase, so will the frequency of moves be decreased. It should be borne in mind that the services are no more anxious to move a medical officer than the medical officer is to be moved.

The military pattern of Canada has changed greatly in recent years. We met the challenge of the First World War by raising a "citizen army" which established an enviable reputation for the Canadian fighting man and after the war these soldiers returned to their civilian occupations. The standing army was reduced to very small size and its role was that of a training cadre only. We met the challenge of the Second World War in the same way and with the same success and in 1946 it was believed briefly that the standing army might return to its traditional peacetime role. However, the growth of Canadian nationhood has brought upon us an increasing international responsibility. Little by little we are taking upon ourselves a part of that mantle so long worn by the United Kingdom. Today in a time of so-called peace, we are defending our country with troops stationed on foreign soil in Europe and in Asia. It is difficult to believe that these responsibilities will become less in the near future, and in the future, as in the past, wherever Canadian troops may be stationed they will be accompanied by Canadian medical units.

The future of military medicine depends upon the number of doctors who are prepared to practise it. In the above paragraphs a number of questions have been asked as to why more Canadian doctors are not prepared to accept this responsibility and it is probable that the answer to none of them alone is the answer to the problem as a whole. It appears to those of us who are engaged in the practice of military medicine that a challenge lies with the entire medical profession of Canada. So long as Canada must maintain armed forces, military medicine will have a role to play and its practitioners must come from the ranks of Canadian doctors. How this is to be accomplished is commended to the very earnest consideration of the profession as a whole.

THE NATIONAL RESEARCH COUNCIL

Its Nature and Functions

EDGAR M. NEPTUNE, Jr., *Lieutenant (MC) USN*

TO MOST medical officers, unless they have served previously in research and development assignment in Washington, the National Research Council is little more than a name. Yet the Council, though not a Government agency, influences their activities in many ways. Service policies on blood, plasma expanders, antimalarial therapy, physical standards, water treatment sanitation, and many other topics have been greatly influenced by NRC recommendations. Much of the military medical research program is reviewed by its committees. A brief report on its nature and functions may, therefore, be of interest.

Both the Council and its parent organization, the National Academy of Sciences, owe their existence to the Government's need for competent, impartial scientific and technical advice on military problems. The Academy was chartered by Congress during the Civil War as an independent advisory body; much of the impetus for its formation came from the Navy, and 12 of the 50 original members were officers of the armed services. In 1916, when another war threatened, the National Research Council was formed by the Academy at President Wilson's request. A more flexible and effective organization, it was designed to mobilize the resources of the nation's scientific and technical societies to deal with the increasingly complex problems of war.

The membership of the Council includes representatives of the government, appointed by the President; representatives of scientific and technical societies; and members at large, chosen to round out its scientific competence. The Council is subdivided into eight divisions,* which conduct its affairs in their respective fields of science. Day-to-day administration is carried out by a full-time resident staff.

*Physical Sciences, Mathematics, Engineering and Industrial Research, Chemistry and Chemical Technology, Earth Sciences, Medical Sciences, Biology and Agriculture, and Anthropology and Psychology.

From the Bureau of Medicine and Surgery, Department of the Navy, Washington, D. C. Lt. Neptune is now assigned to U. S. Naval Medical Research Unit No. 3, Cairo, Egypt.

The Division of Medical Sciences is responsible for most of the Council's activities that are of interest to physicians. Even within this one division, however, the range of activity is broad, including such matters as blood, plasma expanders, shock, trauma, environmental hygiene, stress, psychiatry, dentistry, cardiovascular disease, cancer research, and fellowships.

The Council and its Division of Medical Sciences function principally in an advisory capacity, and have no executive authority in any area of science nor over any other agency. When a government agency or other accredited organization must act upon a matter pertaining to medical science, and believes that it does not have sufficient information available nor adequate expert advisors, it may request the advice of the National Research Council's Division of Medical Sciences. If the chairman of the Division considers the subject to be within the scope of the Division, he may refer the request to one of the many standing committees of experts, convene an *ad hoc* committee, or obtain one or more individual opinions, the choice depending upon the nature of the problems.

The experts who compose these committees are scientists of outstanding reputation in their respective fields, and they continue to devote themselves to their respective scientific pursuits in addition to assisting with the affairs of the Division. These men are selected by the chairman of the Division with the approval of the chairman of the National Research Council, and are appointed on an annual basis; they serve with one or more committees and the composition of each committee can be varied as circumstances require. They receive no honorarium or fee for their services. Although the time devoted to committee work varies, an average member might attend three annual meetings each of one or two days' duration in Washington. He would also spend considerable amount of time in preparation for each meeting.

When a request for advice is referred to a committee, a member of the professional staff of the Division obtains all available pertinent information dealing with this matter and sends the request and the assembled information to the committee members. The committee then meets, usually at the National Academy of Sciences-National Research Council Building in Washington and makes a recommendation to the chairman of the Division. The committee may, in certain instances, delineate specific studies that appear necessary for an answer to a given question, or suggest specific investigators who would be competent to undertake research on the problem in question.

Medical research proposals from civilian scientists submitted to the Department of Defense agencies for financial support are frequently referred to the Division of Medical Sciences, and review of such proposals may be a significant part of a committee's agenda. A committee may also conduct informal discussions or formal symposia on timely and pertinent scientific problems.

There are a few committees that are charged with giving more general advice on policies and broad programs. The Committee on Naval Medical Research advises the Navy concerning its entire intramural medical research program. A new Committee on Army Medical Education is undertaking a comprehensive study of education, training, and career management in the Army Medical Service. The Committee on Veterans' Medical Problems has guided the Veterans Administration in its program of follow-up studies of military casualties and other contractual medical research.

Financial support for the extensive activities of the Division of Medical Sciences and the full-time professional staff is derived from contracts with the various agencies and organizations, both public and private, that make extensive use of its advisory services. In keeping with the Council's charter, the Division is prepared to advise other agencies upon request, insofar as may be feasible without contractual support. However, the Council receives no direct appropriations from the Congress, and its endowment income is small.

As indicated previously, the chairman of the Division is given a great deal of authority for the conduct of its advisory activities, and bears responsibility for the scientific validity of any advice that the Division offers. The activities of the Division, however, are reviewed periodically by an elected executive committee, and again at the annual meeting by the membership of the Division as a whole.

Among the many scientific advisory bodies in Washington, the Academy-Council occupies a unique position. It derives official status from the Academy-Congressional charter and from the Executive Order under which the Council operates; and yet, being independent of the Government, it is free of administrative and political pressures. Having no authority, it builds no empires; its advice is sought, not imposed. Bias is avoided because committee members are chosen by independent scientists rather than by those who seek the advice, and serve voluntarily without remuneration. In these principles lies the strength which has preserved its influence and prestige throughout the vast upheavals of the past 91 years.

THE NAVAL INDUSTRIAL DISPENSARY

A Valuable Training Experience for the Young Military Physician

THEODORE B. KROUSE, *Lieutenant (MC) USNR*
EGBERT WAGENBORG, *Hospitalman, first class, USN*

As all discerning professional readers know, the current civilian medical literature is composed for the most part of articles about the more scientific aspects of medicine. One reads much about clinical applications, basic research, and case reports. Statistical compilations are numerous. The details, when one considers the great number of specialties, are so staggering in volume and complex in presentation that they are impossible to assimilate; therefore, there have developed "summary journals," journal clubs, conferences, and symposia.

In the narrower realm of military medicine the problem is not much simpler. Articles in those journals devoted to the military physician are nearly as varied. For example, the Naval Establishment is the source of articles on the admittedly fascinating fields of amphibious, aviation, submarine, sea-duty, and hospital medicine; there also are articles from the epidemiologic research teams and the recently opened field of arctic or cold-weather medicine.

Notable by his absence is the spokesman for dispensary medicine. At this level, where much of ambulatory medicine is practiced, one finds a most unanticipated and unusual opportunity, seldom appreciated, for medical personnel to function on a very broad base of activity. Particularly wide is the spectrum of activity when the dispensary is civilian-industrial in type and the medical officer is on duty alone. This article, therefore, presents some aspects of dispensary practice and procedure which are not readily discernible in an industrial activity. Because the vast majority of medical officers come to naval dispensaries without prior indoctrination or orientation, dispensary practice proves to be a strong testing of their adaptability, ingenuity, and aggressiveness within the flexible framework of the Manual of the Medical Department, Naval Regulations, and current directives.

From U. S. Naval Aviation Supply Depot, Philadelphia, Pa.

"A dispensary is a medical treatment facility primarily intended to provide examination and treatment for ambulatory patients, arrangements for the transfer of patients requiring bed care, and first aid for emergency cases."[1] Though basic, these functions of the dispensary are not the only ones. "Dispensaries are also intended to perform a wide variety of nontherapeutic activities related to the health of the personnel served, such as physical examinations, inspections, and immunizations."[1] Bed care is not provided; "on occasion, a dispensary may render visiting care of patients in their own quarters."[1]

Naval dispensaries are universally distributed, supporting such diverse activities as shipyards, port bases, air stations, supply depots, manufacturing plants, and island bases. It has been our privilege to have served in a variety of these installations. A description of the important considerations in managing a dispensary supporting a very large aviation supply depot will illustrate problems common to all installations. In examining the three general areas of dispensary work—administrative, general medical, and industrial health and sanitation—let us consider those features which make the experience of dispensary service a rewarding one.

ADMINISTRATIVE DUTIES

Orientation. The physician unfamiliar with this type of duty may be assumed to have had no previous indoctrination. This assumption is usually justified. A short indoctrination course, sponsored by the command, is most useful at this time. Such a course familiarizes the physician with the total structure and function of the activity rather than with the medical facilities only. All too often a military physician, without proper indoctrination, knows only the dispensary (or just the area of the dispensary to which he is "assigned"), the parking lot, officer's club, and the main gate to home. And nothing else. This is what we like to call "medical myopia," a manifestation of a narrow viewpoint, and hence a viewpoint to be condemned. Through the indoctrination course the physician becomes familiar with most of the job classifications and becomes conversant with the technical language of the activity. This wide knowledge gains him the respect of nonmedical persons, prepares him to speak intelligently at conferences, and establishes widespread rapport. He gains a favorable vantage point from which to treat occupational injuries with the proper comprehension of the dynamic interrelationship of employee and working environment. The physician should soon come to realize that his role in industrial military medicine is almost identical with that of his colleague in civilian industrial medicine—giving prompt treatment to the patient while representing the employer's interests.[2]

If no course is planned, the physician should take a number of "field trips" in the first few weeks and orient himself.

Filing Systems. The filing system is the very heart of administration, and medical personnel would do well to survey this area. Experience with records stands one in good stead for the business side of medicine, whether one "goes regular" or returns to the civilian world. Maintenance of good notes and records for the next officer and his enlisted associates is a moral responsibility. Also the physician may be on duty at night or on a weekend when for some reason a record may be necessary, and, in the absence of the corpsman, ignorance of the filing system may render an emergency more complicated. Not the least of the benefits is the physician's opportunity to learn and understand the Hospital Corps' function, and to inspect, suggest improvements, commend, and criticize on a daily basis. The physician who waits for a yearly inspection party to uncover gross errors is derelict in his duty.

Narcotics and Alcohol. Responsibility for these crucial supplies rests directly on the physician, and is peculiar for two reasons. First, the term "narcotic," like the terms "opium," "drugs," "sleeping pills," stimulates an exaggerated concern in the fearful or ill-informed layman. That these supplies can be like an ogre and a monster to line and supply-corps officers is very understandable and excusable. It is the duty of medical personnel to take the subject of narcotics most soberly. Superiors must be assured and convinced of our integrity. Supplies should be checked frequently. All security regulations must be adhered to in the strictest sense. Small amounts should be dispensed as needed. Prescriptions should be written immediately upon dispensing, and logged properly. Legibility of records is important. All rewrites and erasures should have an explanatory remark, and only one corpsman should be responsible for the records. We have spent many hours digging up old records, assembling loose prescriptions, figuring the old usage rates, interpreting hieroglyphic scribblings, weighing powders, counting pills, measuring volumes, taping homogeneous items together, and constantly checking with "the book." In our minds, the time is always available, the effort is not too great, and the results are satisfying. And the need never arises when one must "lock the barn door after the horse is stolen."

Second, there is always a very real possibility that drug addicts and promiscuous users are employed within the compound. We have encountered such persons and we know such a situation to be potentially a most embarrassing one. Such persons must be identified, closely observed, handled with diplomacy, and, in some cases, sternly warned.

Civilian Medical Records. A "health biography" on each employee is a necessary record. A card system has recently been introduced at our activity which enables us to maintain a rapid check on the chronologic course of any employee's complaints and the resulting treatment. All manner of details can be recorded, such as telephone calls to the employee's home, nontherapeutic investigations, poor co-operation with the Medical Department, and sources of contact with relatives and friends if the patient should be absent. There have been occasions when supervisors of such employees have been aided by information on our cards. Although records of occupational injuries are maintained separately, a note of each such injury is made on the above cards and any significant relationships are made obvious. The physician contemplating his return to civilian practice will find that these cards are identical with the type used in private practice.

Disaster Plan. Supervision of a disaster plan is a necessary function. In these times, the military medical man recognizes the dynamic changes in concepts of warfare. He visualizes the probability of all-out conflict as a sudden, catastrophic, unanticipated attack upon a civilian populace remote from a front-line area. Hence, the Medical Department expects to co-operate intimately with other military and civilian agencies in planning for such an emergency. In setting up plans for co-ordination, the department must be aware of the specific amount and location of everything from plasma and blankets to cots and bandages. It is emphasized that interest in this preparation has to be taken now, not after the first alarm!

Disaster Personnel Training. Personnel must be trained to support the medical officer in event of emergency. Training may be in the form of lectures and demonstrations twice a week. At this activity, a 12-lecture Primary Training course and six-lecture Refresher Training course are given which cover a sensible and practical range of subjects, such as hemorrhage, asphyxia, shock, wounds, type and location of our disaster supplies and their uses, and gas and atomic casualties.[3] The courses are informal, seminar in character, and given personally by the medical officer. Every effort is given to consider this training as part of our primary mission and therefore to maintain motivation at a high level according to current technics.[4]

Medical Supplies. Medical personnel become familiar with their stores by perusing the newly issued Federal Standard Stock Catalogue, the storeroom, and the inventory books. When opportunities arise, as they have recently, for obtaining certain sup-

plies "without reimbursement or allocation to any activity," the physician and appropriate subordinates can use some "business sense" in improving and modernizing inventory within the limits prescribed by current directives and requisition objectives.

The Daily Journal of the Medical Officer. The Manual calls for the maintenance of a log "in which shall be entered a complete, concise record of pertinent matters within the purview of the Medical Department."[5] This log can be kept in a very routine and lackadaisical manner, or be made a valuable record of the daily "going's on." We have attempted to make our journal a record of binnacle and sick listings, receipt and detachment of health records, inspections, ambulance movements, lectures, meetings, and courses given or attended. The journal tells about the leave time of our personnel, medical supplies received, administrative and collateral duties of the physician, narcotic inventories, medical and laboratory reports, night and weekend activity, group and special physical examinations, fire drills, medical cases of unusual interest, and all special emergencies and conditions in the compound. Included also are projects within the department, important visitors, commendations and criticisms, and visits to other naval activities by our personnel. Even printed or pictorial matter of pertinent interest which does not interfere with the continuity of the log or lend to sloppy appearance is appended from time to time. The admiral is able to survey our activity at any time by checking this "department diary."

GENERAL MEDICAL DUTIES

Sick Call. Probably one of the best known butts of joking and ribbing is the good old "sick call." This is great meat for those who are prone to point out the gross inadequacies of industrial, "company," or Federal medicine. And yet, if one but pauses a moment, it is apparent that sick call need not be any lower in the scale of good medical practice than are private office calls. Sick call, to our way of thinking, is a most intriguing and stimulating experience. It is identical to general practice. Available is the equipment, the ready hand of the nurse and corpsman, the laboratory, and the private cubicle. The opportunity to practice high-grade diagnostics and therapeutics at the dispensary level is limited by only two factors—time and interest. At the present time iatrogenic disease is being recognized, and the medical officer must examine himself objectively for evidence of oversympathy, hostility, and the utterance of rash statements.[6] Treatment of mild psychoneurotic disorders does not represent a difficult psychiatric problem, and therapy should be prompt, symptomatic, and superficial.[7] Any attempt at deeper therapy, however,

will result in being swamped with much of the emotional unhappiness of the activity, and when there are hundreds of persons all too willing to open up their hearts to a patient audience and a sympathetic ear, a great deal of unhappiness is involved—too much for the facilities of an industrial dispensary. A compromise between too much and too little care is only possible in a command where the senior officers have insight into our problems. Our philosophy is reflected by the statement of the admiral who, at a recent conference, stated that "In a business such as we are in [supply] 80 percent of our assets are people, and people are persons. Each person is a personality and has to be considered in a personal way."[3]

Dependent Care. This is the most controversial and sensitive medical-care issue in the armed services today. At this writing, despite the ill-defined and fluid areas of responsibility, a large part of the total work load of an industrial dispensary can be dependent care. This depends, of course, on the number of resident military in the area. At present, the amount of this care is a compromise between the command and the medical officer, and friendly haggling and stickling does occur. Diplomacy, tact, and the art of medicine are factors of paramount importance in supplying this care within the limits of the facilities available. Very recently, dependent care in the Philadelphia area was greatly curtailed, mainly at the naval hospital. The outlying dispensary must reassess how much or how little it is prepared to do, and yet co-operate always with those who have medical problems. The implications are obvious.

When care is provided, however, the physician can gain much experience in both office and house call technics while treating patients of all ages, with every complaint from accidental injury to communicable disease. Just as some activities to save time and personnel have instituted the "appointment plan" in lieu of all-day sick call,[9] we attempt to use an appointment method for dependents. At one military hospital, a dependent-separation letter explaining the medical facts about the period of confinement has been prepared, and is given to the patient to present at future stations.[10] We have kept medical records on dependents and very frequently give them memos of their illnesses to present at the next station. As for the general problem, it is sufficiently great as to have been the subject of one of Dr. Casberg's[11] monthly messages.

Medical Coverage. Medical coverage is as important in military medicine as it is in civilian practice. Almost all personnel are in a strange town or city, and do not have the support of families and friends. When emergencies occur, the medical personnel of

the area are called upon to give aid. Coverage at the dispensary level is often given 24 hours a day and seven days a week. This is part of a moral responsibility which may or may not be appreciated by those outside the services, or even by those receiving treatment, but which should be considered by the physician as a responsibility.

Physical Examinations. At the level of the supply depot dispensary, the physician in passing on qualifications is called upon to make use of all Civil Service regulations, and must pass judgment on such examinations as those for cafeteria workers, warehousemen, military annuals, promotions, retirement-disability, and hazardous and light duty. He must also co-ordinate aviation physicals with the aviation surgeon.

INDUSTRIAL HEALTH AND SANITATION

Sick Leave. In industry, there is a relatively small number of people, who, for one reason or another, are responsible for accidents, absenteeism, tardiness, alcoholism, job turnover, and inferior morale. The physician with some knowledge of industrial psychiatry will be able to ferret out the cause, prescribe remedies, and counsel to prevent a few from lowering the morale of the group.[12] Sick leave investigation and correction presents an opportunity to serve the command in a unique capacity as a "medical detective." By recourse to civilian physicians, pharmacies, reports of visitors, friends and relatives, the course of illness can be tracked down and fair judgment made. Again, tact, diplomacy, and the ability to think lucidly and speak quietly and effectively are important assets in this work.

Industrial Medical Research. With the exception of sick call, this area of dispensary activity has proved to be the most fascinating. This is not basic research but rather research on a practical, clinical level. The command may have questions concerning almost anything from urinal mats to paint fumes, and answers are expected promptly. The ability to analyze, assess, and decide without being involved in minutiae is of cardinal importance.

Blood Donor Campaign. When "out in the field" urging blood donation, the medical officer comes to realize the prominent role he plays in this program. Various duties are connected with this important work. The physician may find himself selling the American Red Cross Blood Program over an amplification system to 5,000 persons, urging donations from a hallful of people, publicly congratulating the members of the "Gallon Club," or assisting the Red Cross teams in the actual operation of collecting. All this is as important as the academic study of blood, and the research upon it.

COMMENTS

Industrial dispensary medicine is complex, and the average physician fresh from internship or residency after many cloistered years in school is neither technically trained nor selected to maintain interest in the wide variety of nontherapeutic problems it presents. And yet this interest and intellectual curiosity is the mark of the well-rounded scientist and physician.

Sir William Osler was not solely an outstanding diagnostician. His insight and understanding ranged the entire gamut of human thought and endeavor. As long ago as 1894 he recognized that the average medical school could hardly "be expected to equip army surgeons with the full details of special training."[13] And military medicine was far simpler then. He also recognized the advantages of military medical service which are often interpreted by our contemporary doctor-draftees as insufferable burdens. He described the advantage of changing residence, the privilege of acquaintance with men of varied capabilities and training, and the self-reliance demanded by isolated medical practice, emphasizing that isolation often breeds originality.

Many of the physicians who are called into the services as a result of Public Law 779 are likely to have a sense of frustration and hostility toward the military. In the words of Churchill,[14] "the moment a doctor gives way to frustration and reacts emotionally, he can see nothing good in the service and becomes resentful toward it." If these physicians can be stimulated to think about military service on an intellectual rather than emotional basis, we will have done our best to develop an immediately effective member of the team.[15]

SUMMARY

1. The naval dispensary is an important area of general practice in the Naval Establishment. The naval industrial dispensary is even more important, as it includes broad aspects of industrial and nontherapeutic medicine as well as clinical practice.

2. Industrial dispensary medicine vies in importance and complexity with the more striking and more publicized specialties of amphibious, aviation, submarine, research, and naval hospital medicine.

3. Medical officers considered for independent duty at such dispensaries should, whenever possible, be chosen from those who have had some prior experience or training in industrial psychiatry, occupational medicine, or the various administrative fields. In order to render rapid decisions, they should be able to analyze heterogeneous data in close co-ordination with other

departments. Qualities of independent and adaptable leadership are desirable traits.

4. Specialty training in internal medicine, psychiatry or public health, and preventive medicine are preferred prerequisites for this form of duty.

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LET PATIENT TALK?

Students frequently are advised to let the patients talk. This, however, can be permitted only to a very limited degree. It has also been said that if patients talk enough, they will talk themselves into a diagnosis. This rarely occurs; usually the patient talks himself out of a diagnosis, chiefly by confusing the examiner and by not keeping interrogation and conservation along channels which may offer information. Certainly, the immature student will become hopelessly confused by letting patients talk aimlessly. It requires tact, discretion, judgment, and experience to shut off those who aimlessly wander, relating irrelevant details. Nevertheless, some patients must be encouraged to talk.

—FRIEDRICH W. NIEHAUS, M. D.
in *Postgraduate Medicine*,
p. 375, April 1954

THE INTERSTATE MILK SHIPPERS PROGRAM

An Aid to Milk Sanitation in the Armed Services

LOUIS R. KAUFMAN, *Lieutenant, junior grade (MSC) USN*

THOSE in the armed services responsible for the sanitary control of dairy products delivered to military activities are constantly faced with the difficult task of determining the source and quality of the milk used in the preparation of these products. This is particularly true when a dairyman supplements his supply with raw milk procured from distant areas, for then it is not always possible to conduct the important "source" inspections. The great distances that must be traveled, the amount of time and expense required to visit the farms, and the shortage of experienced personnel pose serious handicaps for the inspecting service. Experience has shown that in determining over-all quality it is not practical to rely solely on examination of the raw milk (as delivered to the pasteurization plant), or of the finished products (as delivered to processing activity), because many methods can be used to successfully sophisticate an inferior product. It is therefore essential that reliable information be obtained regarding the background of these supplies whenever field inspections cannot be made. An excellent source of this kind of information is the U. S. Public Health Service publication, "Sanitation Compliance Ratings of Interstate Milk Shippers."[1]

This quarterly publication lists the sanitation compliance ratings of those participating in the Interstate Milk Shippers Program under five headings: raw milk supplies, receiving stations, pasteurization plants, pasteurized milk, and sanitation enforcement ratings, each with a numerical score. These scores are made by an official state survey officer, who bases his inspection on the milk ordinance and code recommended by the U. S. Public Health Service. If a dairy intends to sell only raw milk, the inspection is limited to that phase of the code dealing with the producer farms and the receiving stations.

DEVELOPMENT OF THE PROGRAM

Early in 1950 a national conference of Federal, State, and local milk regulatory bodies was held in St. Louis, and methods

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were developed for the certification of milk shipped interstate. The program as intended is designed to apply uniform standards, on a national level, for the sanitary control of milk, and to eliminate unnecessary duplications of inspections by promoting

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FEDERAL SECURITY AGENCY
PUBLIC HEALTH SERVICE
WASHINGTON, D. C.

Form approved
Budget Bureau No. 68-R.462

INTERSTATE MILK SHIPPER REPORT

(NOTE: Answer all items. Where information cannot be supplied, please indicate reason.)

SHIPPER	ADDRESS	STATE

SURVEY AGENCY	DATE OF SURVEY	SURVEY OFFICER

DATE LAST CHECKED BY USPHS	AGENCY PROVIDING CONTINUOUS SUPERVISION OF SUPPLY

SURVEY REQUESTED BY	DATE

1. DAILY RECEIPTS *(As of date of survey)*

TOTAL VOLUME OF GRADED MILK RECEIVED	VOLUME OF SUPPLY REPRESENTED BY RATING GIVEN IN 4. BELOW	IS MILK OTHER THAN GRADED MILK RECEIVED?
GALS.	GALS.	☐ YES ☐ NO

2. PRODUCTS FROM RATED SUPPLY WHICH MAY BE AVAILABLE FOR SHIPMENT

	MILK	CREAM	SKIM	POWDER	OTHER *(Specify)*
RAW					
PASTEURIZED					

3. TYPE OF SURVEY *(Check one)* ☐ INDIVIDUAL SHIPPER ☐ AREA

4. RATING

	PRODUCERS	RECEIVING STATIONS	PAST. PLANTS	PAST. MILK	ENFORCEMENT
TOTAL NO.				X X X	X X X X
TOTAL SURVEYED				X X X	X X X X
RATING (PERCENT)					

5. ITEMS OF SANITATION OF LESS THAN 75% COMPLIANCE

RAW TO PLANT MILK
RECEIVING STATIONS
PASTEURIZATION PLANTS

6. LABORATORY CONTROL

NAME AND ADDRESS OF APPROVED LABORATORY	DATE LAST CHECKED BY THE OFFICIAL AGENCY

7. PUBLICATION OF RATING *(Written permission of Shipper necessary for publication)*	WRITTEN PERMISSION RECEIVED FROM SHIPPER ☐ YES ☐ NO DATE

DATE OF REPORT	SUBMITTED BY *(Signature and Title)*	AGENCY

8. INTERSTATE SHIPMENTS *List below name and address of out-of-state plants supplied in past 6 months from rated supply (other than normal milk shed shipments).*

CONSIGNEE PLANTS	CITY AND STATE	PRODUCTS	VOLUME AVG. IN GALS/DAY

(Continue on reverse side)

ADDITIONAL INFORMATION ON THIS SHIPPER MAY BE OBTAINED FROM SURVEY AGENCY

Figure 1.

reciprocity between the producing and receiving states. The authorities of each state are responsible for the inspection and supervision of the milk supplies within their jurisdiction, while

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the Public Health Service provides assistance in training, certifying, and spot checking their methods. The milk sanitation survey officers are specifically designated members of the State Health Department. Each officer is responsible for reviewing the inspection procedures used in the control of interstate supplies, and for the reporting of results of official surveys for inclusion in the list. A specific report form, the "Interstate Milk Shipper Report" (fig. 1), is used for this purpose. All ratings reported remain in effect for a period of two years unless superseded by another survey.

Participation in the Interstate Milk Shippers Program is entirely voluntary; however, not all dairies are eligible to join. The following basic requirements must be met before a dairy can apply.

1. The dairy's "milk supply must be under the routine supervision of an official sanitation supervising agency—State or local."[1]

2. "Supervision shall be based on the procedures and the Grade A standards of the Milk Ordinance and Code recommended by the U. S. Public Health Service."[1] Dairies in communities not following this code may be eligible provided their regulations are substantially equivalent to it.

3. The dairy's "supply must be under a program of routine laboratory control."[1] The laboratory must be "checked by the State laboratory certification agency" and found to be "complying with APHA Standard Methods for the Examination of Dairy Products."[1]

At the present time there are about 400 dairies, in 29 states and the District of Columbia, co-operating in this program, and the number increases with each additional publication. As more and more people become aware of the program's value it is expected that eventually the great majority of large dairies in this country will be members. Recently the committee on Administrative Practice in a proposed report[2] endorsed the basic principles of the Interstate Milk Shippers Report.

MILITARY USES

The armed services have much to gain from co-operating with and using the Interstate Milk Shippers Program because it provides information concerning the background of milk obtained by the participating dairies. If a dairy supplying milk is co-operating in the sanitation program and the ratings are satisfactory, the military inspector need not concern himself too greatly about inspecting the milk sources. He can use this time in supervising dairies that are not participating in the program, but are supplying milk to some activity under his jurisdiction.

The program is also useful to the official responsible for classifying and approving dairies to sell products to military activities. According to current procedures, milk is classified into one of three groups: Number 1, Number 2, or Number 3. Federal Specification C-M-381e, the quality guide for general mess milk, specifies that Number 1 milk (milk produced in localities having and enforcing the milk ordinance and code recommended by the USPHS and equivalent to Grade A) must be purchased when it is available in adequate quantities. This definition is complicated by the fact that the specification permits milk from localities not following the USPHS recommended code to be classified as Number 1, provided it is of a quality equal to that produced under the code.

The problem of determining whether a dairy will qualify under the "equal quality" clause rests with the classification official. Again the Interstate Milk Shippers Program is helpful. Because the requirements to qualify as Number 1 milk are essentially the same as those necessary for a dairy to participate in the program, it can be assumed with reasonable assurance that a dairy participating in the program and having a pasteurized milk rating of 90 percent or better can provide Number 1 milk. Frank and asscciates[3] stated: "* * * a pasteurized milk rating * * * does mean that the pasteurized milk supplies in general of the community in question are as safe as a reasonably strict enforcement of the milk ordinance recommended by the Public Health Service will make them. Citizens who limit their purchases of milk to Grade A pasteurized milk secured from communities with 90 percent ratings may, for all practical purposes, ignore the danger of milk-borne infection."

It is important, however, that the sanitation enforcement rating reported be given careful consideration. A dairy should not be classified Number 1 if the sanitation enforcement by the local health authorities is not adequate to maintain the high ratings reported on the Interstate Milk Shippers List.

Dairymen who simultaneously serve several large installations occasionally find themselves with an insufficient raw milk supply for their needs. This situation usually is of concern to military officials responsible for the sanitation of dairy products, for it means that these milk contractors often must procure an added supply, the source and quality of which is not always completely known. As mentioned above, it is not feasible for the military inspector to investigate each individual source, and it is possible that Number 2 or Number 3 milk could be mixed with and sold as Number 1. Since the development of the Interstate Milk Shippers Program, procurement of additional milk no longer should be a problem. A source of information is available whereby the contractor can locate other dairymen willing to sell milk

from a source which has been inspected and rated for interstate shipment. Thus a supplementary supply can be obtained that is of a sanitary quality equal to or better than the contractor's regular supply. The military inspector should insist that supplemental milk, when purchased, be from dairies co-operating in the Interstate Milk Shippers Program and having satisfactory ratings.

SUMMARY AND CONCLUSIONS

The Interstate Milk Shippers Program, sponsored by the U. S. Public Health Service, is intended to supply buyers with information concerning the sanitary quality of milk. It furnishes the military officials responsible for the classification of milk and dairy products with the data necessary to make fair appraisals. The program also contributes toward uniformity of acceptance standards by the various branches of the armed services, eliminates duplication of inspections, reduces the cost of the sanitary control of milk and dairy products, and establishes closer relationships between the armed services and local milk regulatory groups.

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DERMATOSES AMONG FOOD HANDLERS

An analysis of 2,001 dermatological cases referred to me for examination and opinion as to questionable occupational etiology or aggravation revealed that 110 were food handlers. Of the 110, 82 cases were judged to be due to something encountered in their work, and 28 were judged to be nonoccupational in origin. This is a high percentage of occupational cases, when food handlers are considered as a class: of the 2,001 dermatological cases studied, 63 percent were found to be due to occupational causes, whereas among food handlers the percentage rose to 75 percent. Therefore, dermatological eruptions, when seen in food handlers, are far more likely to be due to their work than among other groups.

—GEORGE E. MORRIS, M. D.
in *Industrial Medicine and Surgery,*
p. 343, Aug. 1954

REACTION OF TROOP COMMANDERS TO A MENTAL HYGIENE CONSULTATION SERVICE

BERNARD H. SHULMAN, *Captain, MC, USA*
NORMAN E. MYERS, *Captain, MSC, USA*

MENNINGER[1] drew attention to the poverty of communication between the psychiatric service and "the line" prior to World War II. War brought with it increasing recognition of the severity and complexity of the military neuropsychiatric problem.[1,2] One result of this awareness was an expansion of neuropsychiatric services for the purpose of preventing manpower loss due to psychiatric casualties. More and more the military medical service began to stress prevention of these losses by early active intervention and alertness to possible future psychiatric problems.[3-6]

Started in 1942 at Fort Monmouth, N. J., the mental hygiene consultation service is a recent organizational aspect of the Medical Corps' struggle to solve neuropsychiatric problems. By 1945 there were 36 such facilities in various military stations, attached usually to training centers or divisions.[6] A mental hygiene consultation service differs from a formal neuropsychiatric clinic in a hospital in that it is not primarily a clinic; its first function is prevention rather than cure. Of necessity the scope of action of the psychiatrist in the mental hygiene consultation service is broader than in the neuropsychiatric clinic. In the latter the psychiatrist's interest is restricted to his patients, referrals, and consultations.[7] In a mental hygiene consultation service the main activity must be educational orientation toward the problems of the leader as well as those of the recruit.[8] Here the psychiatrist must observe, judge, advise, support, correct, encourage, remove the unfit, and salvage the desirable, all for the purpose of assisting unit commanders in dealing with soldiers who have adjustment problems.

Troop commanders, after learning of the manpower-saving potential and the philosophy of the psychiatrist in the mental hygiene consultation service, were quick to welcome such facilities in their attempts to produce and maintain a well-trained, effective military force. The psychiatrist and troop commander began to understand each other. The former began to think in terms of the problems facing a military leader and to modify his

From Mental Hygiene Consultation Service, Fort Belvoir, Va.

technical language in order to communicate his concepts more clearly. He considered unit morale and effectiveness rather than restricting his attention to the problem of the individual soldier.[3] The commander, on the other hand, learned to appraise the psychiatric problems of his men in more realistic ways, to make use of problem soldiers more effectively, and to avoid situations which would result in unnecessary mental stress for his troops.[3]

Published reports[4–6] have indicated the value of the mental hygiene consultation service plan. Criteria generally used to examine effectiveness of the program are absent-without-leave and venereal-disease rates, frequency of courts martial, and the number of men hospitalized for neuropsychiatric observation. We believe that there is another less objective, but equally meaningful, criterion for determining effectiveness of a facility which practices preventive psychiatry. This is the commanders' reaction to the mental hygiene consultation service. That is: in what ways have the troop commanders been influenced by the mental hygiene consultation service, and what are their feelings about the facility in their unit?

MATERIAL AND METHOD

During the course of the study conducted at this facility, 62 officers most closely identified with policymaking (the commandant and his staff) and troop control (company, battalion, and group commanders) were interviewed in order to obtain their opinions about the mental hygiene consultation service. The answers to the questions asked in personal interviews ranged from a few words to a 30-minute discussion.

RESULTS

The four specific questions asked and the answers obtained are enumerated below. The figures in parentheses represent the percentage of interviewees who included this answer in their response. The investigators arrived at these percentages by interpreting and classifying the interviewees' spontaneous replies. Interviewees frequently gave more than one answer to each question. Some did not answer one or two questions.

What in your opinion has been the value of the mental hygiene consultation service to troop commanders?

1. It educates officers and enlisted cadre in how to recognize the sick and how to effectively use the emotionally handicapped (68 percent).

2. It provides prompt action when assistance is requested by the troop commander (32 percent).

3. It eliminates the unfit and the unsalvageable soldier (13 percent).

4. The psychiatrist provides a liaison between commanders and the nearest hospital facility (10 percent).

In what ways has the mental hygiene consultation service helped you specifically?

1. It provides early treatment and rehabilitation of trainees (61 percent). The Director of Personnel of the Engineer Replacement Training Center reported that from 60 to 65 percent of "problem trainees" were "salvaged" by the mental hygiene consultation service who would otherwise have been separated from service.

2. It advises concerning effective classification and assignment of personnel (24 percent).

3. It assists at courts martial, command investigations, and boards convened under Army regulations 615-366, 615-368, 615-369, and 600-443 (19 percent).

4. It offers lectures and informal conferences on mental health topics of interest to commanders (19 percent).

5. It is helpful to the inexperienced commander in handling suicidal risks, and in differentiating between the sick soldier and the malingerer (18 percent).

Has the mental hygiene consultation service ever hindered you from performing your job in the way you considered most effective? Has it ever failed to meet your needs?

1. It could provide more assistance during stressful periods in training, such as rifle range, close combat course, and infiltration course, where professional observation and recommendation can be of immediate aid (27 percent).

2. It is sometimes too lenient with problem soldiers (16 percent.

3. Occasionally in critical cases of problem soldiers, it delays decisive action too long (13 percent).

4. Recommendations for clinical treatment are not always clearly expressed. More uniform and consistent follow-up by the service is desirable (eight percent).

5. Army leaders need more information concerning its mission, function, potential contribution, and limitations (five percent).

Can you suggest improvements in the function of the mental hygiene consultation service?

1. It should help teach the less experienced unit commanders how to use psychiatric counsel and assistance. Junior officers and noncommissioned officers should have lectures or other forms of orientation in understanding the problem soldier (52 percent).

2. Its staff needs to pursue a more vigorous program of professional "support," to include daily contact with each training company, in the field if possible (27 percent).

3. The psychiatrist should familiarize himself more with the problems of the commanders and trainees (18 percent).

4. It should devise tests and surveys to aid in the early discovery of potential problem trainees (eight percent).

COMMENT

The majority of commanders interviewed considered the mental hygiene consultation service's promptness in answering a request for help one of its most valuable features. The psychiatrist and his staff arranged to examine referred soldiers within 24 hours of referral in order to initiate effective help as soon as possible. The commanders were interested in learning how to deal with the problem soldiers. The mental hygiene consultation service often received requests for information on specific methods of handling certain trainees. The leaders valued the action of the psychiatrist in eliminating the unfit and unsalvageable soldiers who required a disproportionate amount of attention from officers and cadre and usually lowered group morale.

The mental hygiene consultation service psychiatrist provided a liaison between the station hospital and the training center. He presented the problems of the troop commander to the physicians providing medical treatment for trainees in the hospital, and he explained to the commanders the nature and purpose of medical limitations for trainees.

Officers responsible for classification and assignment welcomed the help of the mental hygiene consultation service staff. At courts martial and investigations the psychiatrist acted as a working member of an administrative team. Commanders were thus more ready to consider the psychiatrist not only a physician who treated patients but also a specialist collaborating with other specialists in support of the group mission.

A useful service was the support and comfort the mental hygiene consultation service gave to leaders who became anxious when confronted by soldiers with the "dramatic" symptoms of a major hysteria, grand mal epilepsy, suicidal gesture, et cetera.

To help them handle panic reactions among some trainees, the troop commanders desired more assistance at certain training periods during which combat conditions were realistically simulated.

Leaders have a realistic fear that an epidemic of malingering will result if a trainee can use the medical service in order to avoid duty. Doubtless such situations sometimes occurred; the mental hygiene consultation service received evidence of them in

increased referrals of soldiers with vague complaints. On the other hand, those patients for whom certain permissive measures were recommended nearly always justified such treatment by showing improvement in their condition. In general, our recommendations did not include a lessening of the hardships of duty unless we believed it was necessary for the rehabilitation of an otherwise useless soldier.

We considered it part of the psychiatrist's duty to inform the leaders of how he can contribute to the efficiency of their units, to delineate the function of the mental hygiene consultation service, and to define the various forms of neuropsychiatric problems which may arise. A lack of understanding by troop commanders of the function of the psychiatrist may sometimes make them suspicious of the value of his service.

Personnel on the mental hygiene consultation service believe that all except psychotic trainees should be given a suitable trial of duty. The early discovery of potentially maladjusted soldiers will not be made until those noncommissioned officers who are directly concerned with training are able to recognize the danger signals of impending trouble. Furthermore, the psychiatrist cannot predict the eventual success or failure of the performance of many borderline patients because he does not know every trainee's future job assignment or who his leaders will be.

SUMMARY

We have recorded the opinions and reactions of a group of troop commanders. Generally these officers expressed much appreciation for the mental hygiene consultation service within their command. It behooves a supporting facility such as this service carefully to consider the impressions of the troop commanders because, for practical purposes, the actual value of a psychiatric facility is in direct ratio to what commanders consider its value to be. Through such a study the mental hygiene consultation service has had the opportunity to examine its errors of omission or commission, to correct misinterpretations, and to advance in those areas where the commanders wanted further psychiatric help.

CONCLUSIONS

This study reveals certain basic beliefs among command officers concerning the operation of a mental hygiene consultation service in this training center. It is considered that the following points have application to other military installations.

1. This service simplifies, mitigates, and reduces the neuropsychiatric problem in the Army.

2. Its functions are still not as well known to the troop commanders as they should be; consequently this facility is not yet completely integrated into the command.

3. Its operations tend to go beyond strict, doctor-patient relationships and to become concerned with the mental hygiene aspects of the total situation.

4. Promptness of the service's action is appreciated.

5. The facility is a source of comfort to commanders in dealing with the problem soldier.

6. There is a tendency on the part of some officers to overestimate the abilities or the role of the psychiatrist.

7. Specific treatment recommendations are sometimes considered "mollycoddling."

8. There is a general desire for more active participation by the psychiatrist in the training program.

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MODIFIED SPRUE DIET FOR ULCERATIVE COLITIS

The approach to the treatment of chronic ulcerative colitis is encumbered with so many disappointments and controversial opinions, none too hopeful, that the observations derived in this paper are presented very humbly with fervent hope that this type of management will open a new avenue to an ultimate conquest of this dreadful disease. The conclusions reached in our study embrace a period of the past three years. When a number of our chronic ulcerative colitis patients had relapses, in desperation when all of the established methods of therapy, such as terramycin, sulfa, ACTH, and cortisone, failed, a modified sprue diet was instituted. The improvement was dramatic and it followed from 48 hours to four days after starting the specific diet.

—HENRY A. MONAT, M. D.
in *American Journal of Gastroenterology,*
p. 197, Mar. 1954

Dermatitis Following Topical Application of Antihistamine Preparations

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WHEN antihistamine drugs first came into use, it was hoped that they would be the "cure-all" for various allergic disorders. They did provide temporary and dramatic relief in many instances to sufferers from allergic rhinitis, bronchial asthma, urticaria, and other allergic manifestations. With the discovery of new antihistamines of different chemical natures even more active compounds with less side effects were made available. Initial enthusiasm and glowing reports of their value soon appeared in the medical literature. After almost a decade of use, it is clear that their value as topical agents has lessened considerably. They have cured very few patients with dermatologic disease, if the cause was not removed, but have served some usefulness in the relief of pruritus.

With ubiquitous and voluminous usage of any drug for a considerable time, allergic reactions are prone to occur in a certain percentage of persons, as is seen in the rapidly increasing rate of penicillin reactions.[1]

It is well known that the topical route is one of the most effective methods of producing allergic sensitivity to a drug. It is recalled that this problem previously arose in connection with the topical use of sulfonamides and penicillin. This led to the withdrawal of the acceptance of topical forms of these anti-infective agents because their therapeutic value is outweighed by the high incidence of sensitivity reactions, and because they are effective against local infections when administered systemically. Subsequently, sulfonamides[2] and, later, penicillin[3] preparations to be used topically were deleted as acceptable dermatological preparations from the American Medical Association's *New and Nonofficial Remedies*.

The antihistamines are gradually becoming common skin sensitizers. Nomland[4] stated that the antihistamines used locally are second among cutaneous sensitizers. Numerous cases of contact dermatitis have appeared following the application of antihistamine creams.[5] Usually the patients have applied the preparation

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periodically for several years in an attempt to control pruritus associated with various dermatoses.

Based on the opinion and experience of leading dermatologists, the Council on Pharmacy and Chemistry, American Medical Association, concluded that the risk of contact dermatitis now overshadows the efficacy of the topical use of antihistamine drugs.[5]

Figure 1. Acute contact dermatitis of the perianal region following application of two percent tripelennamine hydrochloride in a water-soluble ointment base.

Other time-honored preparations are valuable and effective antipruritics and rarely sensitize. These include medicated baths,[6] colloid, oatmeal, or tar, and the use of antipruritics such as menthol, chloral hydrate, camphor, liquor carbonis detergens, calamine, and witch hazel in lotions, emulsions, ointments, and pastes. There also are a few proprietary antipruritic creams that are low sensitizers.

The following three case histories are cited as typical examples.

CASE REPORTS

Case 1. A 40-year-old woman was observed with the chief complaint of an acute dermatitis of five days' duration. For many

years she had experienced severe episodes of pruritus of the perianal region. In order to obtain relief she had applied various antipruritic ointments. Antihistamine creams, when originally used, provided considerable relief. With the onset of the latest episode, two percent tripelennamine hydrochloride in a water-soluble ointment base was applied. Within 24 hours there was marked burning with the development of typical acute contact dermatitis. The dermatosis was cleared with soothing dermatological preparations. After one week, a patch test with two per-

Figure 2. Site of patch test on right forearm 48 hours after application of two percent tripelennamine hydrochloride in a water-soluble ointment base.

cent tripelennamine hydrochloride in water-soluble ointment base was made on the left forearm; the control with water-soluble ointment base was performed simultaneously. Within 48 hours there was marked redness and vesiculation at the site of the patch test with the antihistamine, while the control showed no reaction. These findings confirmed our suspicion of an allergic eczematoid type of contact dermatitis due to the antihistamine (fig. 1).

Case 2. This 38-year-old woman entered the dermatology clinic with a chronic lichenoid dermatosis of the left upper eyelid. She gave a history of being given an antihistamine ointment by another physician for recurrent pruritus of the eyelid. A few hours after the application of the preparation there was marked itching and spreading of acute dermatitis over the entire face. This dermatitis subsided spontaneously within a few days with soothing

therapy. A patch test with two percent tripelennamine on the forearm revealed a four-plus reaction within 48 hours; the control was negative (fig. 2).

Case 3. A 38-year-old woman was observed with acute dermatitis of the palmar aspect of hands and fingers of several days' duration. She had experienced recurrent attacks of a dyshidrosis associated with moderate pruritus for several years and had applied an antihistamine cream to relieve the pruritus. Patch tests confirmed the clinical impression of contact dermatitis due to two percent tripelennamine in a water-soluble ointment base (fig. 3).

Figure 3. Contact dermatitis of the palmar surface of the right hand and wrist following topical application of two percent tripelennamine hydrochloride in a water-soluble ointment base.

In addition, we have observed a few cases of generalized urticaria from oral ingestion of diphenhydramine hydrochloride capsules and tripelennamine hydrochloride tablets.

SUMMARY AND CONCLUSIONS

Allergic reactions from antihistamines are progressively increasing. These agents should be considered in determining causes of allergic eczematoid type of skin eruptions. The risk of cutaneous sensitivity from topical antihistamines outweighs their value as antipruritics, and it is recommended that their use be greatly curtailed. Many other antipruritic preparations are as effective, and rarely produce sensitization.

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ANTIBIOTICS FOR EVERYONE?

Physicians, to a greater extent than any persons, know of the impact of antimicrobial therapy on the practice of medicine and the natural history of infectious disease. Even they are not fully aware of the enormous quantities of these agents that are used in the United States each year. Penicillin is now being manufactured at a rate of well over 300 tons per annum—equivalent to 150 million courses of three million units each year. More than 100 tons of streptomycin are made, which would permit the administration of 100 million 1-gram doses of this agent. The broad spectrum drugs are also produced in enormous quantities. It is believed that the rate is not less than 250 tons per annum. This is enough to permit the administration of 25 million 10-gram courses each year. Information is not readily obtained as to the production of the other less widely used antimicrobial agents, but it is substantial. Exact figures are not available but it may be readily calculated that more than half a billion dollars a year is spent by patients for these drugs. It is apparent, from these data, that few Americans can escape treatment with antibiotics for any length of time.

—LOWELL A. RANTZ, M. D.
in *California Medicine*,
p. 1, July 1954

Ectopic Opening of Ureter Into Seminal Vesicle

With Hydro-Ureter and Atrophic Hydronephrosis

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ECTOPIC insertions of ureters into seminal vesicles are sufficiently uncommon to merit reporting. In 1950 Hamilton and Peyton[1] were able to find only six previously recorded instances diagnosed clinically, and they reported a seventh. Pasquier and Womack[2] reported an eighth in 1953, and to the best of our knowledge the case presented below is the ninth. Hamilton and Peyton gave an adequate discussion of the underlying embryologic defect.

CASE REPORT

A 26-year-old man was evacuated to this hospital from the 11th Evacuation Hospital on 12 December 1952 with a known ectopic insertion of the left ureter into the left seminal vesicle. The patient had originally been hospitalized at the referring institution because of recurring episodes of left back pain for three years, sexual orgasms unaccompanied by a visible ejaculation for one year, and difficulty in voiding and nocturia for one month. A large, saccular, flabby left seminal vesicle had been found rectally, while excretory urograms demonstrated a normal right kidney, but no evidence of a functioning kidney on the left. At cystoscopy the right ureter and trigone were found to be normal in appearance and location, but the left side of the trigone and the ureteral orifice were absent. An opening in the prostatic urethra into the left seminal vesicle was found, through which a ureteropyelogram was done (fig. 1).

Physical examination at this hospital was essentially negative, save for the rectal findings previously described. Urinalysis, blood count, blood urea nitrogen, sedimentation rate, total protein, and albumin-globulin ratio were all within normal limits. The patient was recystoscoped on 17 December 1952. Just distal to the verumontanum was a large trap-doorlike opening which readily admitted the beak of a 24-sheath panendoscope, revealing a smooth-lined, glistening cavity about

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3 by 2 by 2 centimeters. The opening of neither vas nor ureter could be seen. The ureteropyelogram was repeated. Right retrograde pyelograms were normal.

Figure 1. Retrograde pyelogram showing catheter coiled in seminal vesicle and dilated ureter.

On 22 December 1952, under general anesthesia, a left nephroureterectomy was done through a lumbar approach. The left renal fossa was empty, but opposite the second lumbar vertebra was a globoid mass, 9 by 7 by 6 centimeters, which terminated in a thick, cordlike structure with the same circumference as the descending colon. The ureter was adherent to the lateral surface of the colon as far as the pelvic floor, at which point it crossed the bowel, ran behind the bladder, and, it could be determined digitally, ended in the seminal vesicle. The last viscus was apparently in its usual anatomic site. No definite renal pedicle was identified. Without extending the original incision anteriorly it was possible to dissect the entire ureter free, and all but about 1.5 centimeters of the terminal ureter was removed (fig. 2).

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Convalescence was uneventful. The patient's temperature rose to 100.4° F. the evening after the operation, but he was afebrile thereafter. At about 1200 hours the first postoperative day the patient developed a productive cough, followed at about 1600 hours by signs of a right-sided atelectasis. Shortly thereafter he brought up a large mucous plug and his chest signs disappeared promptly.

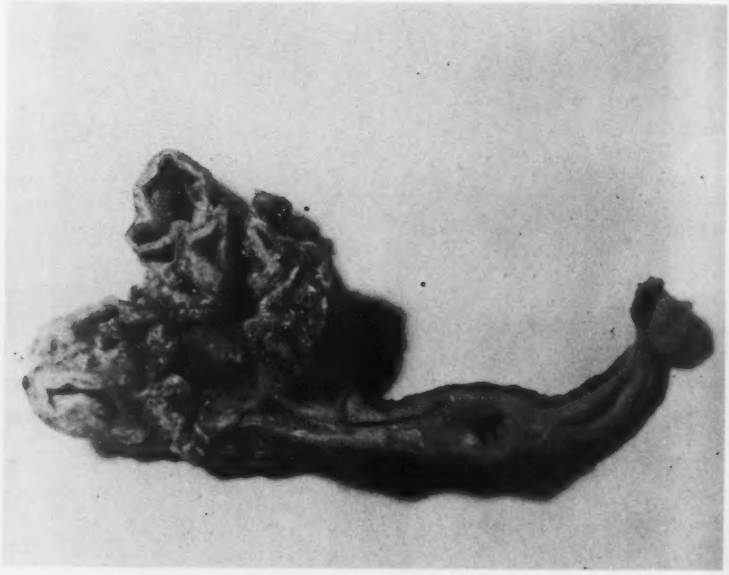

Figure 2. Surgical specimen showing hydro-ureter and atrophic kidney.

The patient left on a week's convalescent leave on 5 January 1953 (the fourteenth postoperative day). Upon his return he stated he had had normal sexual relations again and no urinary difficulties. The left seminal vesicle was questionably palpable. He was cystoscoped on 15 January 1953 and the opening into the left seminal vesicle was no longer demonstrable. The patient was returned to duty on 19 January 1953. When last heard from he considered himself well.

Histologically there was no evidence of functioning renal parenchyma in the walls of the hydronephrotic kidney.

COMMENT

The case history presented here differed from those of Hamilton and Peyton, and Pasquier and Womack in that the seminal vesicle was in its normal position, opened into the prostatic urethra, and did not intrude into the bladder lumen. Further-

more, the surgical management did not include vesiculectomy and excision of the terminal segment of the ureter. This was originally contemplated, but in view of the ease in removing the bulk of the ureter and the adequate drainage of the vesicle, it was believed at operation that additional surgical procedures were not merited. The decision proved valid.

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TRENDS IN GENERAL PRACTICE

The loyalty of the worth-while patient who comes to the family doctor, no matter from what distance, and who waits patiently for the doctor and friend when it becomes necessary for him to come to the home, is one of the most satisfying aspects in the practice of medicine. Questions asked of a large number of doctors in various age groups elicited the information that those in practice from 20 to 30 years or longer enjoyed the loyalty and continuing dependence on them of the great majority of their patients. From younger groups questioned came the rather startling statements that the yearly change in their patient roster ran as high as 60 percent, with an average of 35 percent. Such figures would seem to indicate something lacking in the attitude of the younger physicians. Does the answer to the question implied by these figures lie in the fact that current medical education is turning out scientists rather than doctors and that the younger physicians, as often charged, are treating diseases rather than people? Are they failing to strive to become the friendly, always welcome family doctor who is an intimate, integral part of American life? If they are, they are failing to achieve the most satisfying compensation in a life dedicated to medicine.

—Editorial
in *Medical Annals of the District of Columbia,*
pp. 399-400, July 1954

Ehlers-Danlos Syndrome

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THE Ehlers-Danlos syndrome of hyperelasticity of the skin, hyperextensibility of the joints, and fragility of the skin and blood vessels represents an inherited, constitutional dyscrasia of the mesenchyma. Described primarily in the pediatric and dermatologic literature, this disorder is of importance to the military surgeon because those persons so afflicted may become unsuitable for service. A thorough and complete review of the topic may be found in the report of Johnson and Falls.[1]

CLINICAL SIGNS

Arthrochalasis or exaggerated laxity and mobility of the joints may be of such degree as to cause inability to walk during childhood. Instability of the knees and ankles, markedly flat feet, and recurrent dislocation of the shoulder may interfere with physical activity in adult life. Evidence of extreme degrees of double jointedness may be found in the fingers and toes while instances of involvement of the temporomandibular joint, cervical vertebrae, sternoclavicular articulation, and patella have also been recorded.

Examination of the skin reveals hyperlaxity and hyperelasticity (*dermatochalasis cutis*), particularly over the bony prominences such as the knees, elbows, and shins. Folds of the skin may be pulled three or four inches off the bone and when released immediately retract to their normal position. In addition, the skin may have a velvety texture.

The third manifestation of this syndrome is the pathologic fragility of the blood vessels and skin (*fragilitas et dermatorrhexis cutis*), resulting in easy bruising. Minor cuts or glancing blows may result in gaping wounds which have a tendency to elongate due to the elasticity of the skin. The surgeon may find that sutures tear out and that adhesive tape must be used to approximate the edges of the wound. In other instances, though the skin may not be broken by the blow, large hematomata develop. As a sequel to such injuries, scars become numerous and prominent and leave the skin with a characteristic papyrus or paperlike texture. With

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rare exceptions, studies of the clotting mechanism—bleeding, clotting, and prothrombin times, platelet counts, and serum calcium—have all been reported as normal, although the Rumpel-Leede sign may be positive.

Associated with the above three cardinal features of the Ehlers-Danlos syndrome are two less constant findings. Over the bony prominences or over the Achilles tendon, molluscoid pseudotumors may result from partial reabsorption of hematomata. Due to repeated injury to these areas, the hematomata do not resolve

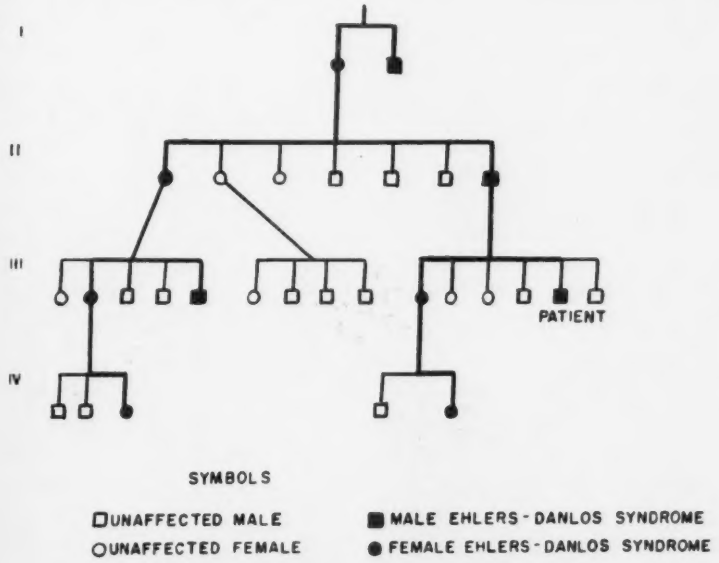

Figure 1. Genealogic tree of a family with Ehlers-Danlos syndrome.

between one injury and the next. Inflammation and infiltration occur, leaving raisinlike elevations of the skin. Weber and Aitken[2] have stressed the presence of subcutaneous nodules as a fifth sign of the Ehlers-Danlos syndrome. Unlike the pseudotumors, these cystlike nodules are located in areas which, although also prone to trauma, have moderate amounts of subcutaneous fat. The spherules are freely movable in the subcutaneous tissue and are from 3 to 5 mm. in diameter. Calcification of the nodules may occur, causing changes visible on roentgenographic examination.[3]

Rossi and Angst[4] have stressed the association of other congenital anomalies with this disorder and believe this association has a bearing on its cause.

PATHOLOGY

Pathologic studies[1,2,5,6] have demonstrated the epidermis to be normal except for wrinkling and mild atrophy. In the corium, the elastic elements are present in increased amounts and show thickening of the elastic fibrils. The collagenous tissues have

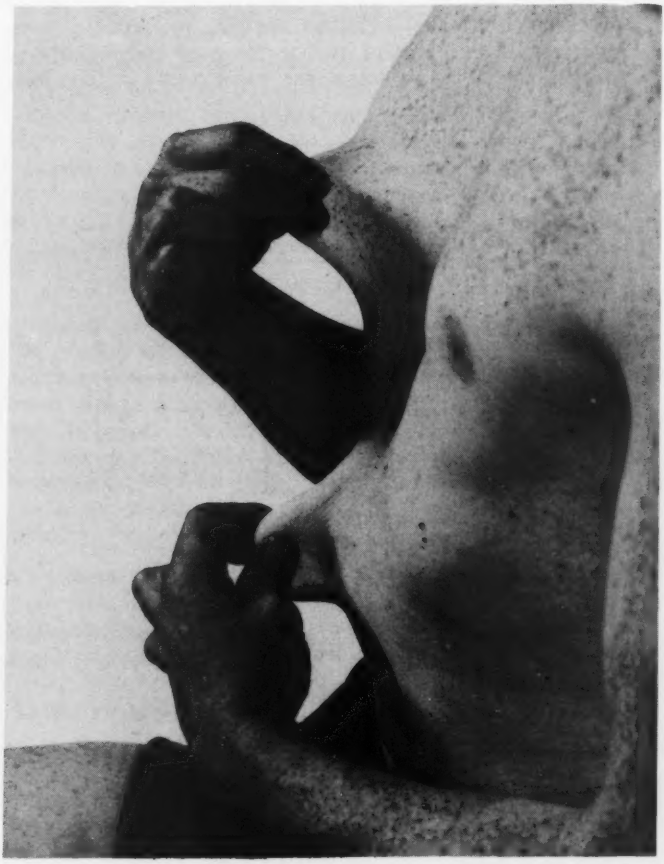

Figure 2. Demonstrating the dermatochalasis cutis of the chest.

been variously reported as increased and as diminished. The blood vessels, although unduly fragile, do not show changes on biopsy. A decrease in subcutaneous fat leaves the vessels with less than normal support. Weber and Aitken have demonstrated the subcutaneous nodules to consist of small budlike lobules of subcutaneous fat from which the pedicle has atrophied, leaving

the nodules freely movable. A thick fibrous capsule surrounds the fat cells, most of which are necrotic, and calcification may subsequently develop in these nodules. The histology of the pseudotumors has been described only scantily. Smith[7] quoted Bolam[8] as describing cavernous angiomas, whereas Holt[3] stated that histologically one finds partially reabsorbed hematomata plus masses of scar tissue.

The exact cause of this syndrome is not understood. Johnson and Falls have summarized the reports of familial inheritance. From their cases, as well as from the case to be presented below, it is suggested that this syndrome is inherited through a dominant transmission. The association with other malformations

Figure 3. The loose skin lifted three inches off the patella.

led Rossi and Angst to believe that the combination of fragilitas et dermatorrhexis cutis, dermatochalasis cutis, and arthrochalasia was merely part of another example of multiple congenital malformations. The pathologic studies would indicate a dysplasia of the mesenchyma.

The following case study illustrates the import of this malady to the military surgeon, and is a further example of this dominant inherited disorder.

CASE REPORT

A 20-year-old soldier was admitted to the hospital prior to a dental operation for evaluation of a history of easy bruising and bleeding.

From infancy, the mildest of trauma resulted in lacerations or hematomata. His skin healed with residual scarring and discoloration, particularly on the legs. He always had had extremely loose skin and had been markedly double-jointed. He had had no difficulty in learning to walk, however, and no tendency to excessive falling because of his hyperextensible joints, although he had once broken his wrist.

Figure 4. Characteristic paper-thin scars resulting from excessive fragility of skin and blood vessels (fragilitas et dermatorrhexis cutis).

The patient's past history was otherwise not contributory and the review of the systems was unrevealing. He had not been born prematurely. Despite the presence of a pectus excavatum he was not short-winded and was able to play the bagpipe. The family was of Irish extraction and other members of his father's family has the same disorder (fig. 1).

The patient was of slight build but well-developed and moderately well-nourished, 69½ inches tall and weighed 137 pounds. The skin was remarkably loose and elastic (fig. 2). It could be drawn from 2 to 4 inches off the elbows, patella, or shins, and upon release would immediately snap back to normal position (fig. 3). To touch, the skin had a velvety, soft texture while

Figure 5. View of the legs showing hyperextensibility (arthrochalasis) of the knees.

over the shins there were multiple paper-thin, discolored scars (fig. 4). Several hematomata were present in the same area. No pseudotumors or subcutaneous nodules could be demonstrated.

Hyperextensibility of the joints was most marked in the fingers, wrists, elbows, knees, and toes. The fingers and wrists could easily be hyperextended until the fingernails rested on the fore-

arms. Similarly the toes could almost bend back onto the dorsum of the foot. Despite a moderately severe genu recurvatum (fig. 5), the legs were stable.

The remainder of the physical examination was not significant except for a moderate pectus excavatum and marked dental caries.

Laboratory findings were generally within normal limits except that clotting time was 18 minutes, 30 seconds.

The patient was returned to full military duty. The rigors of basic training, especially of the infiltration course, however, resulted in numerous lacerations and hematomata, making him unfit for duty and he was discharged from military service.

SUMMARY

A case of the Ehlers-Danlos syndrome with familial inheritance presented here illustrates the importance of this disorder to the military surgeon. Characterized by hyperextensible joints, hyperelastic skin, fragile skin and blood vessels, molluscoid pseudotumors, and subcutaneous nodules, the syndrome may appear either with all the manifestations or as a partial form—*forme fruste*. It is suggested that the inheritance is by a dominant transmission.

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Allergy to milk is not uncommon in infants and can be responsible for a variety of symptoms. At present it is being overemphasized. The milk-free infant foods have a definite and a valuable place in the treatment of some allergic infants, but they are being used altogether too much in many situations which have nothing whatever to do with milk allergy.

—From an editorial
in *Journal of Allergy*, p. 474, Sept. 1953

Hazards of the Tin-Can Ash Tray

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THAT the surgical repair of lacerations on the plantar surface of the foot may result in marked disability has been re-emphasized by our experiences in treating tin-can lacerations. These injuries have been incurred by soldiers when accidentally stepping or jumping on tin cans placed on the floor of the barracks. Ordinarily, suitable receptacles for cigarette stubs are placed on the floor or are attached to posts or walls of the barracks. Occasionally, however, soldiers use empty C-ration or peanut cans as ash trays. These cans have a razor-sharp edge and, if inadvertently left on the floor at the side of the bed, are an accident hazard.

A similar injury to the palm of the hand was observed when a soldier fell out of his bed, striking his hand on a tin can on the floor. A search of the literature revealed no previously reported hand or foot injuries of this type.

Of the 10 patients presenting this injury who were observed within the past year, six had deep wounds requiring hospitalization, and four had minor wounds successfully treated on an outpatient basis. Three of the patients required an extended period of hospitalization. The following cases are presented as typical examples of this kind of preventable accident.

CASE REPORTS

Case 1. This patient, in jumping out of his bed in the barracks, stepped on a tin can on the floor and sustained a 10-cm. laceration on the plantar surface of the left heel. This laceration was repaired in the outpatient department, and the patient was admitted to the hospital to prevent early ambulation. Because of poor skin approximation, his wound required revision. Postoperatively, the foot was immobilized with a plaster splint. After suture removal he was ambulated with a walking cast for three weeks. Subsequently, a sponge-rubber insole was fitted into his shoe, and he was returned to duty five months after injury; the incision remained sensitive to pressure for six months. At that time the midportion of the scar remained depressed (fig. 1).

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Case 2. This patient jumped from an upper bunk, inadvertently stepping on a tin can. He sustained a curved seven-centimeter laceration of the lateral margin of the foot, which was repaired

Figure 1 (case 1). The scar remained depressed five months after injury.

and treated on an outpatient basis. Because a wound infection ensued, he was admitted to the hospital 12 days later. The foot was treated by elevation, compresses, and systemic penicillin. Thirteen days later serous drainage was still present. One month after injury (fig. 2A) the wound was débrided and primarily closed, and the foot was immobilized with a plaster cast. Because of local pain and poor wound healing, weight could not be borne until three months after injury. He was returned to duty four and one half months after injury. At that time the scar was sensitive to pressure and required a sponge insole for prolonged walking (fig. 2B).

DISCUSSION

The foot presents unique problems in wound healing. In standing, the body weight is equally distributed to the heel and the forefoot. By far the greater part of the weight to the fore part of the foot is taken up by the first metatarsal. Weight is distributed

Figure 2 (case 2). (A) *Poorly healing wound one month after injury.* (B) *The wound 17 weeks after injury.*

over the lateral metatarsals for proper body balance. Consequently, poorly healed wounds over the first metatarsal area and over the heel more frequently result in prolonged disability.

The basic principles of wound healing must be strictly adhered to in the treatment of these injuries. Because many of these wounds have been deep, it would seem preferable for the repair to be done in the operating room. Local anesthesia has not been adequate for the cleansing and primary repairing of these wounds. Hemostasis must be absolute; fine catgut ligatures are preferred. The fascia and plantar muscles may be reapproximated

with interrupted sutures of fine chromic gut. Nonabsorbable suture material should not be buried in the weight-bearing surface of the foot; a suture granuloma in this area would be disabling. Interrupted fine-wire closure of the skin is used.

Immediately after repair, the foot should be immobilized by a plaster splint or a cast. The foot must be in a neutral position with adequate support for the metatarsal heads. A cast, if applied, should be split on the dorsal surface to prevent circulatory embarrassment. Bed rest and elevation of the part is desirable. After removal of the sutures, weight bearing to the incision should be delayed by the application of a cast and a walking iron. This may be removed in three weeks. A sponge insole in the shoe is advised when weight bearing might produce undue widening of the scar, with resulting increased morbidity.

It is believed that medical personnel in the armed services should be aware of this problem. Because these injuries represent preventable accidents, unit commanders can greatly eliminate this hazard by providing adequate ash receptacles with blunt or rolled edges.

SUMMARY

Presentation of a series of injuries incurred by inadvertently stepping on tin cans used for ash trays shows that meticulous wound closure and adequate immobilization is mandatory in the proper management of severe lacerations on the plantar surface of the foot. Early ambulation is condemned, as painful scars have ensued. These preventable injuries are unique to the military services.

ROUTINE SIGMOIDOSCOPY

In spite of the emphasis that has been placed on the role of sigmoidoscopy in routine physical examination, the physician too frequently assumes that he has completed an exacting study of the large bowel from anus to cecum by ordering barium enema or air-contrast study. Most roentgenologists today would agree that a "blind area" is present in the sigmoid and rectum during x-ray examination of the large bowel. The bony pelvis obscures detailed study of lesions in the rectal ampulla.

—TIMOTHY A. LAMPHIER, M. D.
in *American Journal of Surgery*,
p. 207, Aug. 1954

A Study of Paracolobactrum Coliforme Strains Isolated in the Far East

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ALICE KASE

PARACOLON organisms (paracolobactrum) attracted medical attention in the Far East after a review of statistics from this area revealed that most diarrheas of short duration in naval personnel exhibit no salmonella, shigella, or *Endamoeba histolytica,* and that slow lactose fermenting coliform organisms are frequently isolated from the feces of persons so afflicted. An investigation of paracolobactrum aboard naval vessels was first suggested. Later this study was extended to cover all such organisms received by this laboratory from Army and Air Force Laboratories in the Far East. A comparison of these organisms with similar strains obtained in Japan and Korea was also made.

Stuart and associates[1] in a study of 233 strains of *Paracolobactrum coliforme* found that 67.2 percent of their organisms were serologically identical or closely related. Thirteen biochemical groups, unrelated to the antigenic mosaics, were established. Little additional information is available on the antigenic components of *P. coliforme,* therefore, an attempt was made to group such organisms isolated in the Far East by serologic means.

Twelve strains of *P. coliforme* were available from Stuart's collection. Five cultures were isolated by one of us (W. C. E.) in California, and 135 organisms came from diarrheas in the Far East. Of the latter, 94 originated from United States Security Forces in Japan, six from Japanese Nationals, 23 from United Nations Security Forces in Korea, and 12 from naval personnel visiting Hong Kong. Ninety-one additional strains were obtained from naval personnel without clinical signs or subjective complaints of diarrhea. These organisms were collected during two trips to Hong Kong. Six cultures were obtained from fomites aboard an attack transport during the second of these trips.

All of these organisms were slow lactose fermenters, and were variable in their fermentation of sucrose and/or salicin. All formed acid and gas rapidly from dextrose and mannitol; were positive for indole; negative for Voges-Proskauer reaction; and,

From 406th Medical General Laboratory, APO 500, San Francisco, Calif.

with the exception of Stuart's strains 16911 and 17611, did not utilize citrate as the sole source of carbon. Hydrogen sulfide was not produced in Kligler's medium.

Serologic groups were determined according to the "O" antigenic structure following the procedure recommended by Kauffmann.[2] "H" antigens and serologic relationships to other genera or groups of entobacteriaceae require further investigations and are not being reported here. Table 1 shows the "O" structure of the examined organisms. With the aid of 14 sera prepared from representative types, 74 antigenic groups were determined, while 17 organisms (6.4 percent) had antigens which did not fall into any of these groups. Only 24 strains (12 percent) did not possess either singularly or in combinations the antigens 1, 2, 3, 4, 5, 6, 9, or 12.

With the exception of serogroups 1, 2 and 3, 4, 5 no other group comprised more than 5 percent of the total number of strains examined. No correlation could be established between the biochemical behavior (fermentation of lactose, sucrose, and salicin) and the serologic structure. Due to the small number of organisms in each group, it was impossible to postulate as to the ecology of the strains. Strains of serogroup 1, 2, 3, 4, 5 comprising 2.5 percent of the total group, however, were not found in diarrheic patients in Japan or Korea, nor were strains of serogroup 1 or 12 isolated from United States naval personnel.

Antigens 6, 9, 10, and 11 did not appear in Stuart's cultures which were isolated in the eastern part of the United States. Several antigens present in these strains which further differentiate members of the groups designated here as 1, 2, and 1, 2, 13 were not observed in the types isolated in the Far East. There was a difference between the strains collected from the United States and those in the Far East.

No serologic group was found limited to cases of diarrhea or limited to an asymptomatic person.

One of the practical implications of this study was, however, the recognition of the antigenic complexity of *P. coliforme* strains isolated in the Far East. It is, nevertheless, possible to use a mixed typing serum in this area, prepared against an organism belonging to group 1, 2, 3, 4, 5 and against another strain belonging to group 6, 9, 12. This serum contains antibodies against antigens present in about 90 percent of the organisms studied here and may, therefore, be considered a polyvalent diagnostic aid in the Far East.

SUMMARY

Two hundred and fifty *P. coliforme* strains isolated in the Far East were studied. They belonged to more than 74 serologic

TABLE 1. *Serologic grouping of* Paracolobactrum coliforme *strains isolated in the Far East*

"O" antigenic structure	Number of strains from					Total strains	Stuart strain number
	Diarrheic patients				Non-diarrhea		
	Japan	Korea	Hong Kong	Others			
1	4			3 (a) (b)	1	8	1811
1,2	6	7		4 (b)	10	27	111,4411 26711,31661
1,2,3	2	1	2	1 (c)	1	7	
1,2,3,4	3 (d)				2	5	
1,2,3,4,5			2		8 (e)	10	
1,2,3,7					1	1	
1,2,4	1				1	2	
1,2,4,6	1(d)					1	
1,2,4,7		1				1	
1,2,4,10	1				1	2	
1,2,5,7,8	1					1	
1,2,5,8,9	1					1	
1,2,6	2					2	
1,2,6,7	1				2	3	
1,2,6,7,8	1				2	3	
1,2,7	1				2	3	
1,2,7,8	4				2	6	
1,2,7,8,13				1(b)	2	3	16911
1,2,7,8,14					1	1	
1,2,7,8,9,13	1					1	
1,2,7,9	1					1	
1,2,7,14					1	1	
1,2,8	1					1	
1,2,8,13	1					1	
1,2,9	5					5	
1,2,9,13			1			1	
1,2,9,14					1	1	
1,2,10	1					1	
1,2,11	2				1	3	
1,2,12	1	1			3	5	
1,2,13				2 (b)	1	3	17611,24611
1,2,14	4				1	5	
1,3,4					1	1	
1,3,4,5			1		3	4	
1,3,11,14	1					1	
1,3,6	1					1	
1,3,14				1(c)		1	

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TABLE I. *Serologic grouping of* Paracolobactrum coliforme *strains isolated in the Far East*—Continued

"O" antigenic structure	Number of strains from					Total strains	Stuart strain number
	Diarrheic patients				Non-diarrhea		
	Japan	Korea	Hong Kong	Others			
1,4					2(e)	2	
1,5	2					2	
1,6	1	1				2	
1,7,8	1					1	
1,9	1			1(a)		2	
1,12	5			1(b)		6	6611
1,13					1	1	
2	1				2	3	
2,3,14			1			1	
2,4,7	2					2	
2,5,10	1					1	
2,6		1				1	
2,6,7		1			1	2	
2,6,12,14			1			1	
2,8	1					1	
2,9	2					2	
2,11,12,14					1	1	
3,4	4				2	6	
3,4,5	8(f)	1	1	1(b)	18(g)	29	311
3,4,6,7	1					1	
3,6	7					7	
3,14					1	1	
4	2					2	
4,6		1				1	
4,10	1				2	3	
5	1				1	2	
6					1	1	
6,7					2	2	
6,9,12		2				2	
7	1(d)					1	
7,8	2				1	3	
7,9					1	1	
8,12	1					1	
10	1					1	

TABLE 1. *Serologic grouping of* Paracolobactrum coliforme *strains isolated in the Far East*—Continued

"O" antigenic structure	Number of strains from					Total strains	Stuart strain number
	Diarrheic patients				Non-diarrhea		
	Japan	Korea	Hong Kong	Others			
12	1	3	1		7	12	
13			1			1	
14			1			1	
Unclassified	5(d)	3		3(a)(b)	6	17	15411, 28221
Total	100	23	12	18	97	250	

(a) Isolated in California.

(b) Type strain received from Stuart.[1]

(c) From the Philippine Islands.

(d) One strain isolated from Japanese hospital.

(e) One strain isolated from fomites.

(f) Two strains isolated from Japanese hospital.

(g) Two strains isolated from fomites.

"O" groups. No connection was found between the antigenic structure and biochemical behavior. No group was found only in the ill or only in the persons without symptoms. Many strains differed from the types described by Stuart and associates.[1] A polyvalent serum, comprising the most frequent antibodies is recommended as a diagnostic aid.

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PUBLICATION OF THE CURRENT LIST

The Bureau of the Budget has approved continuing publication of the *Current List of Medical Literature.* This continuation includes monetary and page limitations, and a restriction on the number of copies which may be printed for official use. It is expected that the Armed Forces Medical Library will be able to operate within these provisions without curtailment of the present scope and coverage of the publication.

EDITORIAL:

The Misleading Unit of Penicillin

When penicillin was first produced, its potency was expressed in an arbitrarily established "unit." This was based on a quantifiable response produced in a specific microbiologic system. The "unit" served its purpose well.

Since that time the inexorable progress of medicine has led to the identification and purification of several penicillin salts, so that a stable reference standard can now be expressed in terms of weight. In fact, the present U. S. Pharmacopeia[1] defines a penicillin unit in terms of weight; *i. e.*, the term "unit" means the antibiotic activity of 0.6 microgram of penicillin sodium. It is obvious that the time has come to discard the outmoded and misleading "unit."

The advantage of *mg.* over *unit* lies not only in its preciseness, but also in its clinical application. With dosages of all other commonly used antibiotics expressed in terms of weight, comparison with penicillin expressed in terms of units may be misleading or confusing. A dose of a "million units" of penicillin sounds like a tremendous amount. It is actually only 600 mg.! Clinical studies comparing various antibiotic agents frequently ignore the true values and compare, for example, 600,000 units of penicillin (about 360 mg. of the sodium salt) to 1 gram of another antibiotic.

In keeping with an editorial[2] recommending that for an interim period both unit and weight equivalent be employed—with the ultimate goal of complete transition in due time—the editors of the *U. S. Armed Forces Medical Journal* will henceforth use both terms. Eventually it is hoped that common usage will cause the disuse atrophy of "unit," and the universal acceptance of mg.—just as occurred in the case of thiamine,[3] digitalis,[3] and other drugs.

"Precedent and convention should never justify malapropistic habits, especially with scientific nomenclature."[2]

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2. Noel, R. H.: Penicillin and "Mrs. Malaprop". (editorial) *Antibiotics & Chemother.* 4: 923-925, Sept. 1954.

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*Oak Leaf Cluster.

The names of officers of the medical services who have been awarded decorations by the United States Army, Navy, or Air Force are published in this department each month following receipt of information from official sources.—*Editor*

CAPT. CALKINS APPOINTED FIRST CHIEF OF NAVAL MEDICAL SERVICE CORPS

Captain Willard C. Calkins, a veteran of 35 years in the naval service, became the first Chief of the Medical Service Corps, U. S. Navy. Prior to this appointment on 29 September 1954, Capt. Calkins commanded the U. S. Naval School of Hospital Administration, National Naval Medical Center, Bethesda, Md.

Capt. Willard C. Calkins (MSC) USN (second from right) being sworn in as the first Chief of the Medical Service Corps of the Navy. Rear Admiral Ira H. Nunn, Judge Advocate General (left), administers the oath of office as Mrs. Calkins and Secretary of the Navy Charles S. Thomas look on.

The position of Chief of the Medical Service Corps was established by Congress in a public law which was signed on 23 August 1954. Previously the Corps was administered by the Assistant Chief for Personnel and Professional Operations, Bureau of Medicine and Surgery.

The Medical Service Corps has grown from about 300 officers at the time of its establishment in 1947 to over 1,000 officers now on active duty.

A MESSAGE FROM THE A. M. A.

With the time for expiration of the Doctor Draft Law (30 June 1955) growing shorter, officials of the Department of Defense and medical manpower experts have been giving consideration to various plans whereby the needs of the armed services for doctors may be met. Dr. Frank B. Berry, Assistant Secretary of Defense (Health and Medical), outlined several such plans in an article in the *Journal of the American Medical Association* in April of this year. It was there indicated that the Department of Defense had sent out copies of a "Senior Medical-Dental Student Questionnaire" to obtain from students an indication of their preference with respect to periods of service. Based on the replies to these questionnaires, the three plans, as outlined by Dr. Berry, were: (1) a "matching plan" whereby the needs of the service are matched, as nearly as possible, with the stated preferences of those liable for service, in terms of service immediately after internship, after two years' training, and after residency training; (2) a plan providing for induction physical examinations during the last six months of the fourth year of medical school, and the first six months of internship, and then separating them into "classes," for induction on certain dates, according to the needs of the armed services; and (3) a plan envisioning a uniform two-year period of hospital internship, or training, at the completion of which the great majority of the group would be available for military service and the smaller portion reserved for residency and deferment consideration.

It has now been indicated by the Department of Defense that a decision has been reached with respect to this problem and that plan (1) above will be substantially followed. The Department has set up the "Armed Forces Reserve Medical Officers Commissioning and Residency Consideration Program" and has issued information concerning it. A "Statement of Preference Form" has been prepared for completion by those liable for military service under the Universal Military Training and Service Act as amended, provided they are graduates of schools of medicine approved by the American Medical Association.

As explained by the Department of Defense, ". . .the Selective Service System has agreed to assist the Department of Defense to provide that physicians obligated for military service

From the Council on National Emergency Medical Service of the American Medical Association. The views and opinions expressed are not necessarily those of the Department of Defense.—*Editor*

and who are commissioned as reserve medical officers be ordered to duty as needed throughout the year following completion of internship, and if more physicians are available than needed to fill requirements, that the excess may be considered for deferment for essential residency training as a joint action of the Department of Defense and the Selective Service System. This solution or plan will be known as the "Armed Forces Reserve Medical Officer Commissioning and Residency Consideration Program." Those obligated physicians who do not become reserve medical officers will be subject to general induction calls placed by the Department of Defense with the Selective Service System. Physicians who are not reserve medical officers will not be considered for deferment for essential residency training nor may they be given any assurance as to choice of military department for service."

In brief, the plan will work as follows: the "Statement of Service Preference" will be submitted as soon as possible; part 1 of this statement will establish the individual's status as a reserve medical officer, or desire to become such, his choice of service, or his desire to be deferred for residency training; part 2 of the statement will give information relative to the type and period of residency training desired. According to the expressed desires, additional forms will then be forwarded, such as "Application for Reserve Commission," "Request for Deferment for Residency Training," and a "Hospital Agreement" form.

A schedule of pertinent dates has been set up, as follows: 10 October 1954, deadline for the return of "Statement of Service Preference"; 20 October 1954, all who request them will receive "Application for Reserve Commission"; 15 November 1954, deadline for the return of "Application for Reserve Commission"; 15 December 1954, notices will be sent out as to those deferred for training in specialties; 1 February 1955, deadline for the return of forms relating to deferment and hospital agreements.

Once when Pitcairn had occasion to visit a lady ill with consumption, he took with him a young friend, recently graduated, who expressed surprise when Pitcairn prescribed nothing more than infusion of roses, with a little mineral acid. Pitcairn turned to the youth: "The last thing a physician learns in the course of his experience is to know when to do nothing, but quietly to wait and allow Nature and time to have fair play in checking the progress of the disease, and gradually restoring the strength and health of the patient."

—LORD MORAN, M. D.
in *The Lancet*, p. 169, Jan. 23, 1954

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DEATHS

FANTOZZI, Sam Joseph, First Lieutenant, DC, USAR, 766 Medical Detachment, Baumholder, Germany; graduated in 1953 from University of Illinois College of Dentistry; appointed first lieutenant 5 August 1953 and ordered to active duty 8 September 1953; died 7 August 1954, age 26, at the 320th General Hospital, Landstuhl, Germany, of barbiturate poisoning.

HOGAN, Vera Francis, Captain, ANC, USAR, Letterman Army Hospital, San Francisco, Calif.; graduated in 1933 from Peoples Hospital School of Nursing, Akron, Ohio; appointed second lieutenant and ordered to active duty 8 May 1945; died 7 September 1954, age 41, at Letterman Army Hospital, of cerebral hemorrhage due to rupture of congenital aneurysm.

HORIUCHI, Gladys Sakae, Second Lieutenant, ANC, USAR, U. S. Army Hospital, Hakata Pen, Japan; graduated in 1950 from Queen's Hospital School of Nursing, Honolulu, Territory of Hawaii; appointed second lieutenant 30 August 1951 and ordered to active duty 8 March 1953; died 17 August 1954, age 28, in Japan, of subarachnoid hemorrhage from a congenital cerebral aneurysm.

LeGAY, Charles Harold, Major, MSC, USAR, Headquarters, Army Forces Far East; entered military service 13 November 1928; appointed second lieutenant 8 October 1942; died 12 September 1954, age 42, in Japan, of coronary thrombosis.

MORGAN, Clifford Veryl, Colonel, MC, USA, Chairman of Army Physical Review Council, Washington, D. C.; graduated in 1927 from University of Nebraska College of Medicine; appointed first lieutenant, Reserve, 16 July 1927 and commissioned first lieutenant in the Regular Army 4 August 1928; died 3 October 1954, age 53, at Walter Reed Army Hospital, Washington, of cardiac failure due to rheumatic aortic stenosis.

PHALEN, James Matthew, Colonel, MC, USA, Retired; graduated from University of Illinois College of Medicine in 1900; commissioned Assistant Surgeon, Regular Army, and entered active duty 30 October 1901; retired 30 November 1936; became secretary of the Association of Military Surgeons and editor of the *Military Surgeon* in 1940, positions he held until 1952 and 1954, respectively; author of several books and articles on medical and military history and biography; died 5 October 1954, age 81, at Walter Reed Army Hospital, Washington, D. C., of coronary thrombosis.

SMITH, Arthur Paul, Second Lieutenant, VC, USAR, Army Veterinary Food Inspection Service, Chicago, Ill.; graduated in 1953 from University of Missouri School of Veterinary Medicine; appointed second lieutenant 15 July 1953 and ordered to active duty 1 October 1953; died 30 July 1954, age 26, at Fitzsimons Army Hospital, Denver, Colo., of cardiac arrest.

ANNUAL MEETING OF MILITARY SURGEONS IN WASHINGTON D. C., 29 NOV.–1 DEC.

The sixty-first annual meeting of the Association of Military Surgeons of the United States will be held at the Statler Hotel in Washington, D. C., from 29 November to 1 December 1954, under the presidency of Dr. Leonard A. Scheele, Surgeon General of the U. S. Public Health Service. The scientific program for the meeting has been arranged by a committee under the chairmanship of Brigadier General Rawley E. Chambers, MC, USA.

Officers and civilian scientists from the military services who are scheduled to preside at sessions or discuss papers include: Colonel Joseph R. Shaeffer, MC, USA, Chief Surgical Consultant, Colonel Donald B. Peterson, MC, USA, Chief Psychiatry and Neurology Consultant, and Major General Oscar P. Snyder, DC, USA, Chief, Dental Division, Office of the Surgeon General, Department of the Army, Washington, D. C.; Rear Admiral John Q. Owsley (MC) USN, Assistant Chief for Personnel and Professional Operations, and Captain James J. Sapero (MC) USN, Director, Preventive Medicine Division, Bureau of Medicine and Surgery, Department of the Navy, Washington, D. C.; Lieutenant Colonel Joseph E. Smadel, MC, USAR, Chief, William L. Pond, M. D., and Maurice Hilleman, M. D., Department of Virus and Rickettsial Diseases, Army Medical Service Graduate School, Washington, D. C.; Brigadier General Harold H. Twitchell, USAF (MC), Director of Professional Services, and Brigadier General Wayne O. Kester, USAF (VC), Assistant for Veterinary Services, Office of the Surgeon General, Department of the Air Force, Washington, D. C.

Officers and civilian scientists from the military services who are scheduled to participate in the scientific program include:

29 November

The Role of the Army in the Maintenance of National Health—Maj. Gen. George E. Armstrong, MC, USA, Surgeon General, Department of the Army, Washington, D. C.

The Role of the Navy in the Maintenance of National Health—Rear Adm. Lamont Pugh (MC) USN, Surgeon General, Department of the Navy, Washington, D. C.

The Role of the Air Force in the Maintenance of National Health—Maj. Gen. Dan C. Ogle, USAF (MC), Surgeon General, Department of the Air Force, Washington, D. C.

The Role of the Veterans Administration in the Maintenance of National Health—Vice Adm. Joel T. Boone (MC) USN (Ret.), Medical Director, Veterans Administration, Washington, D. C.

The Safety of Blood Transfusion in the Treatment of Mass Casualties—Lt. Col. William H. Crosby, MC, USA, Department of Hematology, Army Medical Service Graduate School, Washington, D. C.

Thermal Injuries—Comdr. Donald W. Miller (MC) USN, U. S. Naval Hospital, Newport, R. I.

Injuries Incurred in Aircraft Accidents—Col. Harry G. Moseley, USAF (MC), Chief, Medical Safety Division, Norton Air Force Base, Calif.

30 November

Cost of Accidental Trauma in the Armed Forces—Col. Theodore C. Bedwell, Jr., USAF (MC), Directorate of Professional Services, Office of the Surgeon General, Department of the Air Force, Washington, D. C.

The Prevention of Heat Incapacitation in Young Men—Surg. Comdr. Frank P. Ellis, Royal Navy, Bureau of Medicine and Surgery Liaison, Department of the Navy, Washington, D. C.

The Treatment of the "Nestling" Military Patient—Col. Lucio E. Gatto, USAF (MC), U. S. Air Force Hospital, Sampson Air Force Base, N. Y.

Combat Psychiatry—Col. Albert J. Glass, MC, USA, Deputy Director, Neuropsychiatric Division, Army Medical Service Graduate School, Washington, D. C.

Cost of Non-Battle Injury and Disease as Compared to Battle Casualties—Col. B. Dixon Holland, MC, USA, Chief, Occupational Health Branch, and Col. Arthur P. Long, MC, USA, Assistant Chief, Preventive Medicine Division, Office of the Surgeon General, Department of the Army, Washington, D. C.

Research in the Field of Accidental Trauma—Lt. Comdr. Ross A. McFarland, USNR, Armed Forces Epidemiological Board, Washington, D. C.

1 December

An Epidemiological Study of Heat Injury—Capt. Edgar L. Cook, MC, USA, Army Environmental Health Laboratory, Army Chemical Center, Md.

Recent Advances in Immunization Research and Practice in the Armed Forces—Geoffrey Edsall, M. D., Director, Immunology Division, Army Medical Service Graduate School, Washington, D. C.

Acute Respiratory Diseases; Etiology Prevention and Control in Recruit Training Stations—Comdr. John R. Seal (MC) USN, Head, Communicable Disease Branch, Bureau of Medicine and Surgery, Department of the Navy, Washington, D. C.

Womens Medical Specialist Corps Section Panel

Contribution of Dietetics, Physical Therapy and Occupational Therapy to the Building of Health Defense Frontiers—Lt. Mary B. Carver (MSC) USNR, U. S. Naval Hospital, Bethesda, Md.; Capt. Frances M. Gasson, USAF (WMSC), Hospitalization and Evacuation Division, Office of the Surgeon General, Department of the Air Force; and Maj. Agnes P. Snyder, WMSC, USA, Chief Physical Therapist, Walter Reed Army Hospital, Washington, D. C.

Dental Section Panel

The Dentist and Dental Laboratory Responsibilities in Rendering Prosthetic Treatment—Col. Lynn C. Dirksen, DC, USA, Commanding Officer, Central Dental Laboratory, Walter Reed Army Medical Center, Washington, D. C.

Rotating Dental Cutting Instruments—Col. Donald C. Hudson, USAF (DC), and Maj. Jack L. Hartley, USAF (DC), National Bureau of Standards, Washington, D. C.

Ultrasonics in Dentistry—Comdr. Arne G. Nielsen (DC) USN, U. S. Naval Dental School, Bethesda, Md.

Medical Service Corps Section Panel

Status of the Medical Service Corps of the Army, Present and Future—Col. Robert L. Black, MSC, USA, Chief, Medical Service Corps, Office of the Surgeon General, Department of the Army, Washington, D. C.

Status of the Medical Service Corps of the Navy, Present and Future—Capt. Willard C. Calkins (MSC) USN, Chief, Medical Service Corps, Bureau of Medicine and Surgery, Department of the Navy, Washington, D. C.

Status of the Medical Service Corps of the Air Force, Present and Future—Col. Phillip G. Fleetwood, USAF (MSC), Chief, Medical Service Corps, Office of the Surgeon General, Department of the Air Force, Washington, D. C.

The Role of Optometry and Medical Allied Sciences in the Preventive Medicine Program of the Armed Forces—Lt. Col. Ralph W. Bunn, MSC, USA, Chief, Entomology Section, Preventive Medicine Division, Office of the Surgeon General, Department of the Army, Washington, D. C.; Lt. Col. Samuel P. Daykin, USAF (MSC), U. S. Air Force Hospital, Sampson Air Force Base, N. Y.; Comdr. William J. Perry (MSC) USN, Head, Medical Allied Sciences Section, and Comdr. John H. Steeve (MSC) USN, Head, Optometry Section, Bureau of Medicine and Surgery, Department of the Navy, Washington, D. C.

Pharmacy Section Panel

Pharmaceutical Aspects Involved in Accreditation of Hospitals—Moderator, Lt. Col. Henry D. Roth, MSC, USA, Chief, Pharmacy, Supply and Administrative Section, Medical Supply Division, Office of the Surgeon General, Department of the Army, Washington, D. C.

Nursing Section Panel

Categorization of Patients According to Nursing Care Needs in U. S. Army Hospital, Fort Belvoir, Va.—Maj. Esther Claussen, ANC, USA, U. S. Army Hospital, Fort Belvoir, Va.

The Nurse in Aero-Medical Evacuation—Lt. Col. Frances I. Lay, USAF (AFNC), Chief Nurse, Gunter Branch, School of Aviation Medicine, Gunter Air Force Base, Ala.

Rehabilitation in Neurosurgical Nursing—Lt. Vera E. Thompson (NC) USN, Education Office of Navy Nurse Corps, Bureau of Medicine and Surgery, Department of the Navy, Washington, D. C.

Sanitary Engineering Section Panel

Engineering Aspects of the Noise Health Hazard—Lt. Col. Jack C. Carmichael, USAF (MSC), Headquarters Air Materiel Command, Wright-Patterson Air Force Base, Ohio.

Sanitary Engineering in the Navy—Mr. Burr Lenhart, Bureau of Yards and Docks, Department of the Navy, Washington, D. C.

Field Study of the Use of 3-1 Concentrated Milk at an Army Post—Lt. Col. Robert G. McCall, MSC, USAR, Chief, Environmental Sanitation Division, Army Chemical Center, Md.

Veterinary Section Panel

Training of Armed Forces Veterinary Officers in Health Physics—Lt. Col. Bernard F. Trum, VC, USA, Medical Research Laboratory, Agriculture Research Program, University of Tennessee, Oak Ridge, Tenn.

REGULAR MEDICAL CORPS OFFICERS CERTIFIED BY SPECIALTY BOARDS

The American Board of Physical Medicine and Rehabilitation

Activated in 1947, the American Board of Physical Medicine and Rehabilitation is one of the youngest specialty groups. As of 30 June 1953, this board had certified a total of 239 physicians, of whom the following 11 are regular Medical Corps officers:

James D. Amos, *Maj., USA*
John H. Kuitert, *Lt. Col., USA*
Harold B. Luscombe, *Col., USA*
Walter H. Moore, Jr., *Maj., USA*
Wayne R. Oelhafen, *Maj., USA*
Raoul C. Psaki, Jr., *Lt. Col., USA*
Emmett M. Smith, *Col., USA*
Ben A. Strickland, Jr., *Col., USAF*
Vann S. Taylor, *Maj., USA*
Arthur E. White, *Col., USA*
Clark B. Williams, *Col., USA*

This is the fourteenth of a series. The names of officers certified by the American Board of Preventive Medicine will be published in the December issue.

Pain cannot be ruled out by physical or laboratory examination. The pain threshold is very much the same in all persons. Their reaction to it differs widely. A person's reactions vary with his previous experience with pain, his mental balance, his life situations, his misapprehensions and worry concerning the significance of pain and a desire, or lack of desire, to keep on with his work. It requires profound experience in the practice of medicine to evaluate the significance of pain.

—EARL D. McBRIDE, M. D.
in *Clinical Medicine*, p. 598, Nov. 1953

Reviews of Recent Books

ATLAS OF OPERATIVE TECHNIC, ANUS, RECTUM, AND COLON, by *Harry E. Bacon,* M. D., and *Stuart T. Ross,* M. D. 301 pages; 403 illustrations. The C. V. Mosby Co., St. Louis, Mo., 1954. Price $13.50.

The authors of this excellent volume have produced a comprehensive, descriptive atlas of surgical procedures dealing with diseases of the anus, rectum, and colon. There has always been some interest shown in this field. In recent years, however, it has gradually increased so that it has now assumed its proper importance in the realm of preventive medicine and surgery.

Major surgical procedures with radical resection of all possible lanes of malignant extension are portrayed in detail. Minor surgery occupies a considerable space and is given proper recognition in the same manner. The anatomy of the areas involved and anatomical relations with adjacent organs, followed by descriptive illustrations, are arranged in proper sequence. The text is complete in every way and provides the means by which the busy proctologist or general surgeon may have at hand a reference for rapid review of intended procedures.

This book is the first of its kind, and includes every recent advance. It should prove a valuable addition to all medical libraries.

—*GEORGE M. LYNCH, Comdr. (MC) USN*

AN RH-HR SYLLABUS, by *Alexander S. Wiener,* M. D. 82 pages; illustrated. Grune & Stratton, Inc., New York, N. Y., 1954. Price $3.75.

In glossary discussion form, this compact syllabus covers briefly and adequately on a clinical level every phase of the subject under the sections: fundamentals, Rh antibodies, serology and genetics of the Rh-Hr types, erythroblastoses fetalis, blood transfusion, autosensitization, anthropologic aspects, and medicolegal applications. All this has been accomplished in 82 pages, including an index.

This form of presentation of so complex a subject has many advantages. It serves as a convenient introductory text for readers not specializing in the field and offers them a means for appreciation of current articles on the subject. Physicians particularly interested in the Rh factor, and specialists in the field, will find this book a handy reference and a worth-while refresher. Those responsible for the instruction of blood bank personnel will recognize in this timely booklet the original, "classic" Rh glossary introduced by Dr. Wiener. It is an excellent teaching aid and will be of invaluable assistance to the blood bank student. —*GIOCONDA R. SARANIERO, Lt. Comdr. (MC) USN*

NATURE AND NURTURE: A MODERN SYNTHESIS, by *John L. Fuller.* 40 pages. Doubleday & Co., Inc., Garden City, N. Y., 1954. Price $0.85.

Dr. Fuller, a biologist, presents in this paper a summary of past and present principles of genetics oriented to psychological findings in intelligence, behavior disturbances, and the development of individuality. In considering major genes and polygenes, he writes that "polygenic or multiple-factor inheritance is the type which is of greatest significance to our nature-nurture problem." The inheritance of "susceptibility genes" and the concept of "thresholds" are discussed in relation to normal and abnormal behavior. The author acknowledges that "the biological attributes which are of universal value are physical vigor, the ability to modify behavior according to experience, and the ability to extract meaning from more and more complex situations." A brief bibliography and glossary are included.

While the reader may be no more satisfied with the anonymity of the undefinable polygenetic theory of complex behavior than with the theories of complete social determination, this reviewer believes that this paper can serve as a caution to psychological theorizing which neglects genetic inheritance. The article, while not crucial in itself, is well-worth reading. —*JOHN T. EVANS, Ph. D.*

TEXTBOOK OF BIOCHEMISTRY, by *Benjamin Harrow,* Ph. D., and *Abraham Mazur,* Ph. D. 6th edition. 563 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1954. Price $6.50.

The new addition of Harrow's well-known text, which now bears the name of a coauthor, has been revised, and the subject matter is regrouped, and extended. It preserves the classical format of chapters on the chemistry and metabolism of carbohydrates, lipids, proteins, and inorganic constituents, along with others on digestion, respiration, blood, urine, foods, enzymes, hormones, and energy metabolism. Additional chapters are devoted to tissue chemistry and detoxication and there is a single chapter dealing with sulfa drugs and antibiotics. Economy and clarity of language permit the inclusion of shock, plasma protein fractionation, electrophoresis, chromatography, the ultracentrifuge, and the use of isotopes.

The relatively brief chapter on energy metabolism benefits greatly from the judicious use of sample problems. The treatment of enzymes includes technic for the recognition of enzyme activity, as well as a presentation of the theoretical aspects of enzyme action. The role of high and of low energy bonds is logically developed in connection with carbohydrate metabolism. Vitamins are presented in sufficient detail to reflect present day knowledge concerning their composition and their complex role within the intact organism. The chapter on hormones includes a straightforward discussion of the better known facts concerning the secretions of the thyroid, parathyroid, pituitary, pancreas, adrenal, testes, and ovary; the presentation is detailed

without becoming ponderous. In their handling of the references found at the close of each chapter, the authors achieve a potent incentive to further reading. This follows from a careful grouping of selected literature bearing upon the separate chapter topics, along with notations concerning the specific subject-matter province of the references cited. The volume is further enhanced by the uniform clarity of the figures and tables.

In addition to its value as a text, this book might be expected to serve a highly useful purpose in the clinical laboratory. It is a convenient source of information concerning the basis of many, if not most, of the clinical chemistry determinations generally performed, an index to the composition of blood and urine in the normal and in pathologic states.—*THADDEUS J. DOMANSKI, Lt. Col., USAF (MSC)*

GIFFORD'S TEXTBOOK OF OPHTHALMOLOGY, by *Francis Heed Adler*, M. D. 5th edition. 488 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., publishers, 1953.

This excellent book discusses all the aspects of ophthalmology which the general practitioner should know, and provides a satisfactory outline for teaching ophthalmology in medical schools. It is intended to be an introduction to ophthalmology and should be invaluable to all physicians.

The chapters on examination of the eyes are well presented. The descriptions of functional examinations are detailed enough for the physician to evaluate his patients. The chapters on ocular mobility and the lesions disturbing the pathways preventing normal responses to stimuli are exceptionally well written, and sufficient facts about optical defects are given for clear understanding. External diseases of the adnexa, lids, conjunctivae, the various ocular tissues, and the orbit are adequately presented. The physiology and pharmacology pertinent to the conditions under discussion are briefly presented but the essential factors are given. A clinical approach has been given to the ocular findings in neurologic diseases. The information on vascular diseases is splendidly presented and should be invaluable in physical diagnosis.—*WILLIAM L. SPAULDING, Col., MC, USA*

DIAGNOSIS OF ACUTE ABDOMINAL PAIN, by *William Requarth*, M. D. Foreword by *Warren H. Cole*, M. D. 243 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1953. Price $5.

This handbook presents important diagnostic procedures in acute surgical lesions within the abdomen. The indications for surgical intervention are also included.

The presentation is in three parts: (1) a discussion of the various maneuvers and tests which may be utilized in examination of the abdomen and in arriving at a correct diagnosis; (2) a description of intestinal obstruction and differentiation between obstruction of the small and

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large intestines; and (3) a section concerning a large group of acute diseases of the abdomen, including diagnosis of acute abdominal pain following trauma, abdominal pain in infants, and the differential diagnosis of massive gastroesophageal hemorrhage.

Some of the opinions expressed by the author on such a controversial subject as management of cholecystitis may be questioned. In general, the text is concise, reads smoothly, and is easily understandable. The illustrations are well chosen and clinical manifestations are presented in detail. In addition, pertinent references are included in each chapter.

This small handbook will serve as an excellent reference for the young surgeon—especially on the resident staff—and also for anyone doing emergency work involving the abdomen.

—JAMES D. KING, Comdr. (MC) USN

VETERINARY NECROPSY PROCEDURES, edited by *Thomas Carlyle Jones*, Lt. Col., VC, USA, and *Chester A. Gleiser*, Lt. Col., VC, USA. Sponsored by The Armed Forces Institute of Pathology and The American Veterinary Medical Association. 136 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1954. Price $7.50.

This book is the latest compilation of information on animal necropsy procedures, and covers all species of animals. Each chapter has been written by an eminent pathologist selected because of his particular qualifications in regard to the assigned topic. The book fills a very definite and long recognized need—a need especially apparent at the Registry of Veterinary Pathology where excellent specimens were frequently received in an unsuitable condition.

After the importance of necropsy is stressed, a clear presentation of the general principles of necropsy is given, including the appropriate time, place, equipment, records, methods of euthanasia, and methods of disposal. Succeeding chapters are devoted to detailed procedural instructions pertaining to horses, cattle, sheep, swine, dogs, cats, chickens and other birds, and laboratory and wild animals. Instructions are clearly and concisely presented, along with numerous excellent illustrations.

Further chapters are devoted to instructions on preparing necropsy protocols, selecting and preparing specimens for laboratory examination, and collecting and preserving parasitologic specimens. The final chapter gives suggestions on methods of collecting and submitting samples in a manner that will facilitate laboratory diagnosis. Some 30 diseases commonly requiring laboratory support for diagnosis are discussed.

The ample illustrations are understandable and accomplish their purpose well. All text material is presented in a readable and interesting manner. This book will be a popular guide for veterinarians and others who may be called upon to perform animal necropsies.

—WAYNE O. KESTER, Brig. Gen., USAF (VC)

NURSE AND PATIENT, by *Evelyn C. Pearce*, S. R. N. 182 pages. J. B. Lippincott Co., Philadelphia, Pa., 1954.

This book presents a significant and valid approach to the ethics of nursing and the transitions involved in it, as based on the sound principles of human relations. Its value rests primarily on the clarity with which the reader's concepts are formulated and the ease with which these concepts can be used constructively.

The subject matter is divided into three parts. The first part presents the factors that lead to a physical or mental breakdown in health and the reactions of patients to such a state. Whenever a person is confronted with circumstances which alter his normal way of living and afflict him with pain and disability, his behavior will vary from its normal pattern. Though his behavior varies, it will remain within a reasonably predictable compass. The nurse should recognize this, and, through an understanding of nurse-patient relationships, be able to give the needed support to the patient during the acute stages of his illness and his convalescence. The second part deals with the nurse as a person in a profession that is primarily concerned with persons under the abnormal circumstance of illness. It emphasizes the personal and professional adjustment problems confronting the teen-age student nurse, as she meets the stress and strain of a patient's emotional problems. The last part stresses human rights and their safeguards in society. Consideration is given to the nurse's understanding of the fundamental principles of human relations as related to the preservation of body, character, and soul of man. In conclusion, the author advances a Christian interpretation of spiritual first aid.

This book is especially recommended for student nurses and instructors of young nurses. It should aid the student nurse in acquiring a more meaningful concept of self as related to the ill, as well as a better understanding of the patient's reaction to his illness. To the instructor, it should serve as a reminder of the physical and emotional stress and strain placed on the teen-age student nurse in meeting the problems of the ill for the first time.

—*OUIDA C. UPCHURCH, Lt. (NC) USN*

CLINICAL ORTHOPAEDICS, *Anthony F. DePalma*, Editor-in-Chief. Number 3. 230 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1954. Price $7.50.

This publication is an orthopedic journal in book form that admirably accomplishes the stated purpose of providing a "needed outlet for original articles of orthopedic interest." Divided into two sections, the first section deals with conditions of soft tissues about the joints while the second presents miscellaneous orthopedic subjects.

The first 127 pages are devoted to the section on soft tissues about the joints, which is written by 16 well-known orthopedic surgeons.

The subject is clearly presented and well illustrated by photographs and diagrams. Individual articles are brief, concise, and easy to read. Differences of opinion as to therapy advocated by the various authors is interesting as well as stimulating. R. A. Murray's statement that cysts of the external meniscus are more common in females is probably an inadvertent error.

The section on general orthopedic subjects varies from giant cell tumors to intramedullary pinning of Colles' fracture. This section is also well illustrated, and the authors have made liberal use of simple diagrams which aid materially in clarifying important points.

This bound journal is recommended as excellent reading for the orthopedic surgeon and is considered, together with volumes one and two, to be a valuable addition to any medical library.

—CLIFFORD A. STEVENSON, Comdr. (MC) USN

THE LABORATORY DIAGNOSIS OF LEPTOSPIROSIS, by *J. W. Wolff*, M. D. American Lecture Series, Publication Number 183, A Monograph in American Lectures in Tests and Techniques. Edited by *Gilbert Dalldorf*, M. D. 99 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1954. Price $3.75.

This monograph by a world-recognized authority on the leptospiroses is intended as a practical guide in leptospiral diagnostic laboratory procedure. The technics described were developed in laboratories in the Netherlands and in the East Indies, and are presented clearly and in detail.

In addition to sections on general considerations, leptospiral morphology, staining methods, and diagnostic procedures, sections entitled "Antigenic Structures of Leptospira" and "Characteristics of Type Strains of Leptospira" are included. These latter, while not directly bearing on laboratory diagnostic procedures, are a most valuable supplement to the other sections. The information on the origin of the several type strains and their serologic interrelationships is of especial interest to the leptospiral research worker.

The value of this volume for the American laboratory diagnostician might be enhanced in future editions by photomicrographs illustrating agglutination and lysis reactions and the so-called "breeding nests." Likewise a fuller discussion of serologic methods other than agglutination-lysis would be helpful. Complement fixation methods in particular would appear to warrant greater consideration.

The volume is attractively printed and bound and is of a convenient size to keep as a ready reference in the laboratory. It should serve as an authoritative guide in the diagnostic laboratory, and will be particularly helpful to those who are relatively inexperienced in the laboratory diagnosis of leptospirosis.

—WILLIAM S. GOCHENOUR, Jr., Lt. Col., VC, USA

MANUAL OF PROCTOLOGY, by *Emil Granet,* M. D. 346 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1954. Price $7.50.

The author of this manual, in the familiar yearbook format, states that it is intended not for the specialist but for the practitioner. The reviewer would recommend it also for the intern and resident in general surgery.

Following a short section on anatomy, anesthesia is discussed concisely and the author stresses local or nerve-blocking technics, favoring procaine solution as a short-acting anesthetic and oil soluble anesthetics for prolonged action. Several of the popular, traditional medicaments (suppositories and mineral oil for example) are the subject of an exposé. A section on pediatric proctology and congenital anomalies admittedly inadequate is presented, but those interested are referred to an adequate bibliography.

Anorectal pyogenic infections are concisely but thoroughly presented. The chapter on hemorrhoids is well written, but unfortunately includes five pages on the technic for sclerosing injection treatment. Neoplasms, benign and malignant, are discussed in detail with appropriate statistics and methods of treatment. The subject of ulcerative colitis is presented at length and the more recent indications for surgical management are given.

The treatment of rectal prolapse is presented in a general fashion, and one might object that the more recent approach to surgical treatment of diverticulitis of the sigmoid colon is not discussed. A chapter on pilonidal disease brings the reader up to date on the various methods of treatment. The author favors primary closure but admits its shortcomings and gives indications when it is best used.

As a manual this is an excellent text and serves well as a beginning for the interns, residents in general surgery, and general practitioner. The comprehensive bibliography following each chapter is a guide for the more complicated and detailed procedures. Illustrations are in black and white and are adequate and clear. It is concise, well written, and easily read.—*PHILIP A. COX, Maj., USAF (MC)*

GLANDULAR PHYSIOLOGY AND THERAPY, Prepared Under the Auspices of the Council on Pharmacy and Chemistry of the American Medical Association. 5th edition, completely revised and rewritten. 611 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1954. Price $10.

The first edition of this collection of opinions was published in 1924 when the physiologic functions of the endocrine glands were rather well defined but knowledge of endocrine therapy was very limited. The rapid evolution of therapy in this field during the past 30 years, especially with the developments since the last previous edition of the book in 1942, makes it quite possible that this symposium may not be presented in a sixth edition. Not only have highly potent hormon-

al agents been developed and made available, but also excellent textbooks on endocrinology have been published.

After an introduction to endocrinology, the subject matter is presented beautifully in chapters on the adenohypophysis, the posterior lobe of the hypophysis, the adrenal (cortex and medulla), the ovary (with further consideration of menstruation, ovulation, pregnancy, and lactation), the testes, the thyroid, the parathyroid glands, the pancreas, and the thymus. Separate discussions are added on abnormalities of body weight, endocrine management of neoplastic diseases, abnormalities of sexual behavior, therapeutic uses of cortisone and corticotropin in nonendocrine conditions, behavior and intelligence, the chemistry of hormones, and modes of administration of hormones.

The individual contributors to this volume have performed their tasks in an admirable manner. Each chapter is very well annotated, with a total of nearly 4,000 references cited. These add tremendously to the value of the symposium. Of special interest to the reader not profoundly or predominantly interested in the field of endocrinology will be the chapter on diagnostic aids and the one on common misconceptions in endocrine therapy.—*RALPH L. COX, Col., MC, USA*

PERIPHERAL CIRCULATION IN MAN, edited by *G. E. W. Wolstenholme,* M. B., and *Jessie S. Freeman,* M. B., D. P. H. 219 pages; with 72 illustrations. Little, Brown and Co., Boston, Mass., 1954. Price $6.

This report of a Ciba Foundation symposium followed an earlier one on "Visceral Circulation." Most of the 32 participants in this symposium were from the British Isles and from European countries with some representatives from the United States. The first part of the symposium is devoted to methods of measurement and study of the circulation in man, followed by a section on noradrenaline and adrenaline, and later on the effects of exposure to cold. Other chapters concern the regulation of the blood flow including the neurohistology of the circulation, and final sections are devoted to sympathectomy.

The reports of each investigator on the results of his own work, followed by the discussion of the various members present, is probably the best part of the book. As might be expected, very few final conclusions were reached, but the subjects presented are well covered. Excellent references are included at the end of each chapter.

This book will have a limited appeal because the details presented are not those encountered by the physician in everyday practice. It would be of interest, however, to all those engaged in basic research and clinical research who are studying the peripheral circulation in man. This symposium was successful in the usual objective of this type of meeting of having people from various centers discuss their work and outline their areas of agreement, disagreement, and fields in which there is ignorance.—*SAMUEL H. SANDIFER, Lt. Col., MC, USA*

CLINICAL PATHOLOGIC CONFERENCES OF COOK COUNTY HOSPITAL, Volume I, Cardiovascular-Renal Problems. Edited by *Hans Popper*, M. D., Ph. D., and *Daniel S. Kushner*, M. D. 325 pages; illustrated. The Blakiston Company, Inc., New York, N. Y., 1954. Price $5.

This book, composed of reports of clinical pathologic conferences held at Cook County Hospital from 1946 to 1953, presents chosen examples of cardiovascular-renal disease representative of the majority of patients encountered in that hospital. There are 26 diagnostic problems in all. Case histories observe the usual pattern of following the presentation of clinical data with a clinical discussion. Pertinent pathologic observations and a clinical pathologic correlation are then made. The case is completed by a concise "Final Pathologic Diagnosis." A few well-chosen references are listed, and clear photographs illustrate specific lesions.

In the impressive list of 42 participants, many are nationally recognized authorities in their fields. General medicine is well represented, as would be expected, but many other specialties are included.

The case histories are fascinating to read, and especially interesting to compare with similar examples from one's own experience. Each yields much information on such points as diagnosis, therapy, management, and complications. The clinical pathologic correlations are clear and unusually thorough. There are controversial points of interpretation, which of course must be expected.

This volume is recommended for both the internist and the pathologist. The latter may use it as a guide in choosing similar case histories from his own experience for clinical pathologic conference material.—*PAUL C. LeGOLVAN, Lt. Col., MC, USA*

APPLIED PATHOLOGY, As An Introduction to Disease and Its Control, by *Charles G. Darlington*, M. D., and *Charlotte F. Davenport*, R. N., With the Collaboration of *Albert Segenreich*, M. D. 2d edition, revised. 454 pages; 154 figures, 4 color plates, and 29 charts. J. B. Lippincott Co., Philadelphia, Pa., 1954. Price $4.75.

This book is a revision of the 1942 edition, which bore the title, *Introduction to Medical Science on a Basis of Pathology*. The authors have integrated the basic studies in nursing—anatomy, physiology, chemistry, and microbiology—in a concise and practical manner which makes the material easy to understand and practical to apply in the nurse's everyday work.

The first part, disease and its control, is an introduction to medical science. It deals with the history of medical science, the causes and manifestations of disease, and the therapies and prevention of disease. Particularly important is the presentation of the newer studies on cancer, and the nurse's responsibility in cancer control. The second part on the pathology of disease according to the systems of the body is divided into 12 units, each dealing with a body system, and pre-

senting diseases and treatment of each. Part three deals with the clinical tests and procedures, microbiology, tissue examinations, autopsies, and records, and is particularly interesting and well organized. Various tests are explained, giving the normal and the abnormal reactions. The discussion of the proper method of collecting and handling specimens for the laboratory is most informative and useful.

At the beginning of each chapter, in part two, the unusual medical words used and their correct pronunciation are listed. This is helpful and should aid in increasing the reader's medical vocabulary.

The review exercises at the end of each chapter are excellent, as are the many excellent illustrations. The 14-page bibliography lists all references by chapter.

In all, this is an excellent book for both the student and the graduate nurse.—*MILDRED TERRILL, Comdr. (NC) USN*

ISOTOPIC TRACERS, by *G. E. Francis; W. Mulligan;* and *A. Wormall.* 306 pages; illustrated. Published by University of London, The Athlone Press at the Senate House, London, W. C. 1. Distributed by John de Graff, Inc., New York, N. Y., 1954. Price $7.

Written especially for students and research workers, this theoretical and practical manual concerns the use of radioisotopes as tracers. It will appeal to investigators who desire a concise explanation of the practical aspects of isotope methodology particularly in relation to biological research. The authors have included up-to-date and reliable data on the physical characteristics of radioisotopes and radiations, the types of apparatus and equipment available, and the experimental technics used by other workers in the field.

The book is arranged so that it can be used as a manual for laboratory instruction. Most of the experiments described in the practical section of the book can be conducted satisfactorily in any biochemical laboratory possessing the appropriate Geiger-Muller counters, scalers, and high tension units. Some of the exercises include experiments which were done in research investigations in the authors' laboratory; others were specially arranged, and others were based on publications in various textbooks and journals. The first part of the book contains an excellent discussion of atomic structure, the preparation, synethesis, properties, and measurement of radioisotopes. The chapter on hazards and precautions in the use of radioisotopes should be read by every investigator in this field. Another valuable feature of the book is the appendices which contain considerable useful information and data.

This book is well written and compact. It is recommended as an introductory book for biochemists, physiologists, and others who have a special interest in, but limited experience of, research with radioactive and stable isotopes.—*MAXWELL DAUER, Lt. Col., MSC, USA*

GENERAL CYTOLOGY, by *E. D. P. De Robertis,* M. D.; *W. W. Nowinski,* Ph. D.; and *Francisco A. Saez,* Ph. D. 2d edition. 456 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1954. Price $7.75.

Cytology is of such fundamental significance to medicine and all the biological sciences that the substantial advances made in recent years should be known and understood by students and practitioners as well as by actual investigators in the field. This carefully revised edition of a concise but authoritative text and reference book is therefore particularly opportune. Its usefulness is suggested by the fact that it is to be printed in at least four foreign languages.

The present volume, appearing six years after the first edition, embodies extensive changes in all but one of the 12 chapters, that on history. Important additions include new sections on plastids, cell metabolism, and the effects of radiations and chemical agents in cytogenetics. The cytochemical organization of the cell is adequately discussed and new findings in regard to cytochemistry and ultrastructure are presented.

This is a comprehensive textbook, and as such deals only rather briefly with each of the important aspects of modern cytology. It makes possible a rapid survey of the entire field, and for those who wish to go more deeply into a particular phase extensive bibliographies, current through 1953, are provided at the end of each chapter.

No one concerned with medicine, dentistry, or any of the biological sciences, with the possible exception of advanced students in the field of cytology itself, could fail to find this book both interesting and instructive.—*BENNETT F. AVERY, Capt. (MC) USN*

TEXTBOOK OF THE NERVOUS SYSTEM, by *H. Chandler Elliott,* Ph. D. 2d edition. 437 pages; 158 illustrations and an atlas of 50 plates. J. B. Lippincott Co., Philadelphia, Pa., 1954. Price $9.

This textbook for medical students presents the difficult subject of neuroanatomy in a manner the author believes will assist the reader in remembering and understanding. The thought that this is a text for students and not a reference work for specialists is a constant theme.

In the first part of the book, from chapter 1 through 7, the subject of neuroanatomy is presented briefly and simply. The author terms this section "The Nervous System in Outline." In the second portion of the book termed "The Nervous System In Detail," from chapter 8 through 24, the outline is filled in and the material is discussed a second time. These two sections comprising most of the text are followed by an adequate bibliography and an atlas of 50 photographic plates, 47 of which are accompanied by a well-labeled key. This latter feature is said to have been popular with students.

The book represents another teacher's method of presenting his subject. It appears to be a good one. The medical student should find the

text readable and the diagrams as well as the atlas helpful. A few figures in the text unfortunately are not completely clear, and one clinical reference concerns a possible treatment method in neurologic practice which has largely been abandoned. These are not serious drawbacks, and the medical student should find this text useful.

—*JOHN W. KEMBLE, Col., MC, USA*

CHEMOTHERAPY OF INFECTIONS, by *H. O. J. Collier,* Ph. D. 248 pages; illustrated. John Wiley & Sons, Inc., New York, N. Y., 1954. Price $4.

This volume gives complete and up-to-date information on the development of chemotherapy and the application of drugs in such specific infections as tropical diseases, tuberculosis, and syphillis. The fundamental concept of the host-parasite-drug relationship is presented in a simple and concise manner. The chapters on "The Problem of Getting the Chemical to the Microbe," "The Development of Resistance to Drugs by Microbes," and "How Antimicrobial Substances May Work" are timely and written in a simple fashion. In the final chapter, the author indicates both the limitations and future possibilities in this field.

The author states that, "the present book is planned so that the level rises as the reader proceeds." This plan has been carried out skillfully in preparing a book which may easily be read by persons having a minimum of medical education. The book is well illustrated and each chapter has an adequate reference list, and should serve as an excellent introduction to the field of chemotherapy. It will also be an enjoyable review and refresher source for those more advanced in the subject.—*ROY L. MUNDY, Capt., MSC, USA*

THE BACTERIAL FACTOR IN TRAUMATIC SHOCK, by *Jacob Fine,* M. D. 82 pages. Charles C Thomas, Publisher, Springfield, Ill., 1954. Price $2.75.

This monograph offers a theory to explain why shock can persist and become irreversible despite adequate fluid replacement. The thesis, based largely on the results of animal experimentation, is that bacterial action may be the dominant factor responsible for the irreversible state in various forms of traumatic shock. The author offers experimental proof to refute some of the more popular concepts that have been advanced to explain this condition. He has demonstrated that in the dog, irreversible shock can be prevented if the tissues, in particular the liver, are protected by antibiotics. Prophylactic administration of an adequate dose of antibiotics was more effective than the administration of an equal dose after shock had developed. While this theory may not supply the all-conclusive solution, it does contribute a valuable step toward the understanding, prophylaxis, and treatment of this most complex and frustrating problem.

—*FERDINAND V. BERLEY, Comdr. (MC) USN*

THE JEALOUS CHILD, by *Edward Podolsky*, M. D. 147 pages. Philosophical Library, New York, N. Y., 1954. Price $3.75.

This psychiatrically oriented book seems to be intended primarily for the instruction of parents who are unfortunate enough to have children suffering from any of the following conditions: rheumatic heart disease, tuberculosis, diabetes, obesity, glandular defects, nervous disorder, and speech defects. Incongruously included in this group is the left handed child. The author believes that all such children are bound to develop emotional disturbances unless corrective measures are instituted. He also examines the sad plight of the unwanted child, the adopted child, the illegitimate child, the child of divorced parents, the only child, and et cetera, with special attention to the impact of their peculiar and particular life circumstances on their emotional development.

Although the chapter headings are promising, the contents do not do justice to the complexity of the respective problems, probably because the author is not addressing himself to a professional audience. The problem of jealousy, which is ubiquitous in children, is only dealt with in a cursory fashion, and no sharp distinction is made between normal competitive jealousy and its pathologic variants. The advice to parents is, at times, too stereotyped and nonspecific. The book also suffers from the absence of illustrative case material.

The text is filled with many psychiatric truisms which are not presented in sufficient detail and structure to allow either quasiprofessional or lay readers to intelligently follow any flexible plan and, thereby, like so many other books which have been written over the past few years, would seem only to confuse the reader more than to enlighten.

—*RICHARD R. CAMERON, Lt. Col., MC, USA*

RESUSCITATION OF THE NEWBORN, by *Joseph D. Russ*, M. D. 55 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1953. Price $2.50.

In this short, concise, and clearly written monograph the author has summarized the essential points of neonatal asphyxia and its treatment in chapters on definitions and classifications, the clinical factors contributing to asphyxia, the methods of resuscitation, the after-effects of asphyxia, and the importance of education of physicians concerned with this problem. Both clinical and pathologic considerations are given in connection with the so-called "asphyxial membrane."

The chapter on the clinical factors producing asphyxia in the newborn, including a tabulation of the effects of the various anesthetic agents used in obstetrics, on the mother and the infant, is especially enlightening. A simple routine of resuscitation is presented, embodying the four principles of immediate warmth, minimum handling, a clear open airway, and oxygenation of the blood stream within 30 seconds of severing the cord.

This monograph serves as a useful and practical reference for those physicians having the responsibility of caring for newborn infants before, during, and after delivery.—*CONN L. MILBURN, Jr., Col., MC, USA*

THE CAUSES AND TREATMENT OF BACKWARDNESS, by *Sir Cyril Burt*, D. Sc. 128 pages. Philosophical Library, Inc., New York, N. Y., 1953. Price $3.75.

This volume attempts to survey current knowledge and accomplishments in improving programs for training backward children. The material is presented in a readable and concise style. The chapters are well organized, and although brief, the discussions are comprehensive. An abridgement of some of the author's earlier writings, the book offers both new information and some revisions of earlier recommendations.

The first chapter contains a detailed historical sketch of theories of backwardness and methods which have been used in teaching backward children in England's school system. Other chapters treat the methods which were used in the present investigation, the role of environmental factors in backwardness, and certain personality factors —physical, intellectual, emotional, and moral—as they relate to retardation. The final chapter offers a constructive approach to the problem of educating backward children.

The book serves to provide practical information for the "ordinary teacher." It may also be profitably read by psychologists and psychiatrists for background material.—*WENDELL R. WILKIN, Maj., MSC, USA*

RECONSTRUCTIVE SURGERY OF THE EYELIDS, by *Wendell L. Hughes*, M. D. 2d edition. 260 pages; 268 illustrations. The C. V. Mosby Co., St. Louis, Mo., 1954. Price $8.50.

This new edition is enlarged and contains added material pertaining to upper eyelid reconstructions. Details of altered procedures have been included which will facilitate operations of this type. The author describes time-tested surgical procedures, some that are worthy of use and others which frequently give poor results.

The opening chapter in the book concerns the historical aspects of the subject. Pedicle flap variations, split skin grafts, and conjunctival replacements and revisions are described. Tarsus reconstructions and the results of cilia transplants are also included. Other chapters illustrate the author's methods of blepharopoesis, reconstruction of both lids, and the choice of treatment for various lesions confined to the lids. Mention is made of methods of irradication, from chemical agents to surgical procedures. Lesions sometimes not requiring removal are also mentioned.

The photographs of the steps on head dressing technics are especially good and fulfill a much needed demand. This book should be included in every surgeon's library.—*BERNARD N. SODERBERG, Col., MC, USA*

New Books Received

Books received by the *U. S. Armed Forces Medical Journal* are acknowledged in this department. Those of greatest interest will be selected for review in a later issue.

DISEASES OF THE SKIN, by *Oliver S. Ormsby,* M. D., Rush Professor of Dermatology Emeritus, University of Illinois; Attending Dermatologist to the Presbyterian Hospital of Chicago; Member of the American Dermatological Association and the American Academy of Dermatology and Syphilology; Corresponding Member of the Section of Dermatology of the Royal Society of Medicine, London; of the Societé Française de Dermatologie et de Syphilographie, Paris; of the Dansk Dermatologisk Selskab, Copenhagen; Societas Dermatologica Svecica, Stockholm; Honorary Member of the Wiener Dermatologische Gesellschaft, Vienna; of the Japanese Dermatological Society, Tokyo; of the Greek Union of Dermatology and Venereology; of the Hellenic Antivenereal Society, Athens; of the Nederlandsche Verieniging van Dermatologen, Amsterdam; of the Asociación Argentina de Dermatologia y Sifilologia, Buenos Aires; and Die Deutsche Dermatologische Gesellschaft, Wurzburg; and *Hamilton Montgomery,* M. D., M. S., Professor of Dermatology and Syphilology, Mayo Foundation for Medical Education and Research, Graduate School, University of Minnesota, Rochester, Minn.; Consultant in Section of Dermatology and Syphilology, Mayo Clinic; Member of American Dermatological Association; American Academy of Dermatology and Syphilology; Society for Investigative Dermatology; Corresponding Member of the Societas Dermatologica Hungarica, Budapest; of the Asociación Argentina de Dermatologia y Sifilologia, Buenos Aires; of the Societé Française de Dermatologie et de Syphilographie, Paris; Societas Dermatologica Svecica, Stockholm; La Societe Dermatologique, Copenhagen; and Honorary Member of the Sociedade Brasileira de Dermatolgia e Sifilografia, Rio de Janeiro. 8th edition, thoroughly revised. 1,503 pages; 666 figures, containing 750 illustrations and 18 colored illustrations on 11 plates. Lea & Febiger, Philadelphia, Pa., 1954. Price $22.

PRACTICE OF ALLERGY, by *Warren T. Vaughan,* M. D., Richmond, Va. Revised by *J. Harvey Black,* M. D., Dallas, Tex. 3d edition. 1,164 pages; illustrated. The C. V. Mosby Co., St. Louis, Mo., 1954. Price $21.

CEREBROVASCULAR DISEASE, by *James Peter Murphy,* M. D., Assistant Clinical Professor of Neurological Surgery, George Washington University School of Medicine. Foreword by *Percival Bailey,* M. D. 408 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1954. Price $12.

PSYCHOMOTOR ASPECTS OF MENTAL DISEASE, An Experimental Study, by *H. E. King,* Ph. D., Associate Professor of Psychiatry (Research Psychology), Tulane University School of Medicine. 185 pages; illustrated. Published for The Commonwealth Fund, Harvard University Press, Cambridge, Mass., 1954. Price $3.50.

SHOCK AND CIRCULATORY HOMEOSTASIS, Transactions of the Third Conference, September 14, 15, and 16, 1953, Princeton, N. J. Edited by *Harold D. Green,* M. D., Professor of Physiology and Pharmacology, and Associate in Internal Medicine, Bowman Gray School of Medicine, Wake Forest College, Winston-Salem, N. C. 230 pages; illustrated. Sponsored by Josiah Macy, Jr., Foundation, New York, N. Y., 1954. Printed by Corlies, Macy & Co., Inc., New York, N. Y. Price $3.50.

THE CONTRIBUTION OF ATOMIC ENERGY TO MEDICINE. Hearings before the Subcommittee on Research and Development of the Joint Committee on Atomic Energy, Congress of the United States, Eighty-Third Congress, Second Session on The Contribution of Atomic Energy to Medicine. June 2, 3, and 4, 1954. Printed for the use of the Joint Committee on Atomic Energy. United States Government Printing Office, Washington, D. C., 1954.

PRACTICAL ORTHOPTICS IN THE TREATMENT OF SQUINT (And Other Anomalies of Binocular Vision), revised by *T. Keith Lyle,* C. B. E., M. A., M. D., M. Chir. (Cantab.), M. R. C. P. (Lond.), F. R. C. S. (Eng.), Surgeon and Medical Officer in Charge of Orthoptic Department at the Westminster Branch of the Moorfields, Westminster and Central Eye Hospital; Ophthalmic Surgeon, King's College Hospital; Assistant Ophthalmic Surgeon, National Hospital for Nervous Diseases, Queen Square; Civilian Consultant in Ophthalmology R. A. F.; Formerly Temporary Air Commodore, R. A. F. V. R. and Consultant in Ophthalmology, R. A. F. Overseas. Assisted by *Marianne Walker,* D. B. O. (T.), Certified Orthoptic Technician (U. S. A.); Orthoptist, St. Luke's Hospital, Guildford; Formerly Orthoptist, Oxford and Reading School of Orthoptics. 4th edition. 371 pages; with 195 illustrations including 3 colored plates. The Blakiston Co., Inc., Philadelphia, Pa., 1953. Price $12.

GRAY'S ANATOMY OF THE HUMAN BODY, by *Henry Gray,* F. R. S., Late Fellow of the Royal College of Surgeons; Lecturer on Anatomy at St. George's Hospital Medical School, London. 26th edition, edited by *Charles Mayo Goss,* M. D., Managing Editor of the Anatomical Record; Professor of Anatomy, Louisiana State University School of Medicine, New Orleans, La. 1,480 pages; 1,202 illustrations, mostly in color. Lea & Febiger, Philadelphia, Pa., 1954. Price $16.

THE AMERICAN TEXTBOOK OF OPERATIVE DENTISTRY, With Contributions by Eminent Authorities, edited by *Arthur B. Gabel,* D. D. S., M. A., Edwin T. Darby Professor of Operative Dentistry, The Thomas W. Evans Museum and Dental Institute, School of Dentistry, University of Pennsylvania, Philadelphia, Pa. 9th edition, thoroughly revised. 626 pages; 422 illustrations. Lea & Febiger, Philadelphia, Pa., 1954. Price $10.

OFFICE GYNECOLOGY, by *J. P. Greenhill,* M. D., F. A. C. S., F. I. C. S., Attending Obstetrician and Gynecologist, Michael Reese Hospital; Professor of Gynecology, Cook County Graduate School of Medicine; Attending Gynecologist, Cook County Hospital; Editor of the Year Book of Obstetrics and Gynecology; Author of Obstetrics in General Practice, Surgical Gynecology and Greenhill-DeLee, Principles and and Practice of Obstetrics (11th ed.) 6th edition, revised and enlarged. 517 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1954. Price $7.75.

ORAL CANCER, by *J. Roy Bourgoyne,* D. D. S., Chief of the Division of Oral Surgery, University of Tennessee College of Dentistry, with chapters by *Davis S. Carroll,* M. D., and *Ralph S. Lloyd,* D. D. S. 295 pages; illustrated. Lea & Febiger, Philadelphia, Pa., 1954. Price $6.50.

PRACTICAL FULL DENTURE PROSTHESIS, by *Joseph Simeon Landa,* D. D. S., F. A. C. D., Associate Professor of Prosthetic Dentistry, New York University College of Dentistry; Formerly Clinical Professor of Oral Diagnosis, New York University College of Dentistry; Diplomate of the Board of Prosthodontics; Attending in Charge of Denture Prosthesis, New York Polyclinic Medical School and Hospital; Associate Attending in Charge of Denture Prosthesis, Beth Israel Hospital; Consulting Prosthodontist, Downtown Hospital; and Two Contributors. Enlarged second edition. 501 pages; 218 illustrations. Dental Items of Interest Publishing Co., Inc., Brooklyn, N. Y., 1954. Price $9.50.

THE DIGITAL CIRCULATION, by *Milton Mendlowitz,* M. D., F. A. C. P., Associate Attending Physician, Mount Sinai Hospital; Research Fellow, Columbia University Division of Goldwater Memorial Hospital, New York, N. Y. 182 pages; illustrated. Grune & Stratton, Inc., New York, N. Y., 1954. Price $6.75.

STUDYING AND LEARNING by *Max Meenes,* Professor and Head, Department of Psychology, Howard University. Doubleday Papers in Psychology, DPP 9. Consulting Editor, *Eugene L. Hartley,* Professor of Psychology, The City College, New York, N. Y. 68 pages. Doubleday & Co., Inc., Garden City, N. Y., 1954. Price $0.95.

RADIOLOGY for Medical Students, by *Fred Jenner Hodges,* M. D., Professor and Chairman, Department of Radiology, University of Michigan; *Isadore Lampe,* M. D., Professor, Department of Radiology, University of Michigan; and *John Floyd Holt,* M. D., Professor, Department of Radiology, University of Michigan. 2d edition. 439 pages; illustrated. The Year Book Publishers, Inc., Chicago, Ill., 1954. Price $8.

THE GRAPHOMOTOR PROJECTION TECHNIQUE, Clinical Use and Standardization, by *Samuel B. Kutash,* Ph. D., Chief, Clinical Psychology Section, Veterans Administration Hospital, East Orange, N. J.; Lecturer in Psychotherapy Division of Graduate Studies, Brooklyn College; and *Raymond H. Gehl,* M. D., Psychiatric Consultant, Newark Regional Office, Mental Hygiene Clinic, Veterans Administration; Montclair and Elizabeth Family and Children's Agencies; Practicing Psychoanalyst, Newark, N. J. American Lecture Series, Publication Number 218, A Monograph in The Bannerstone Division of American Lectures in Psychology. Edited by *Molly Harrower,* Ph. D., Research and Consulting Psychologist, New York, N. Y. 133 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1954. Price $3.75.

ENCYCLOPEDIA OF CHILD CARE AND GUIDANCE, edited by *Sidonie Matsner Gruenberg. Frances Ullmann DeArmand,* Managing Editor; and *Pauline Rush Evans,* Associate Editor. 1,016 pages; illustrated. Doubleday & Company, Inc., Garden City, N. Y., 1954. Price $7.50.

NONTUBERCULOUS DISEASES OF THE CHEST, Sponsored by the American College of Chest Physicians, edited by *Andrew L. Banyai,* M. D. Editorial committee, *Seymour M. Farber,* M. D.; *Alvis E. Greer,* M. D.; *Charles M. Hendricks,* M. D.; *Minas Joannides,* M. D.; *J. Arthur Myers,* M. D.; *George G. Ornstein,* M. D.; and *J. Winthrop Peabody,* M. D. 1,152 pages; 280 illustrations. Charles C Thomas, Publisher, Springfield, Ill., 1954. Price $18.75.

DIAGNOSIS AND TREATMENT OF THE ACUTE PHASE OF POLIOMYELITIS AND ITS COMPLICATIONS, edited by *Albert G. Bower,* M. D. 250 pages; 64 figures. The Williams & Wilkins Co., Baltimore, Md., 1954. Price $6.50.

THE VOICE OF NEUROSIS, by *Paul J. Moses,* M. D., Assistant Clinical Professor in Charge of Speech and Voice Section, Division of Otolaryngology, Stanford University School of Medicine, San Francisco, Calif. 131 pages; illustrated. Grune & Stratton, Inc., New York, N. Y., 1954. Price $4.

EXISTENCE AND THERAPY, An Introduction to Phenomenological Psychology and Existential Analysis, by *Ulrich Sonnemann,* Ph. D., Formerly Associate Professor, New School for Social Research, and Clinical Psychologist in Federal Service. 372 pages. Grune & Stratton, Inc., New York, N. Y., 1954. Price $5.

THE BIOLOGY OF MAN, by *John S. Hensill,* Ph. D., Associate Professor of Biology, San Francisco State College; with chapters on Development, Body Framework, and Pregnancy and Birth by *Joel F. Gustafson,* Ph. D., San Francisco State College, and chapters on The Disease Process and Invading Agents by *Herman Zaiman,* M. S., Formerly of San Francisco State College. 440 pages; illustrated. The Blakiston Company, Inc., New York, N. Y., 1954. Price $5.50.

ATTITUDES IN PSYCHIATRIC NURSING CARE, by *Madeline Olga Weiss,* R. N., B. Sc., M. Litt. 111 pages. G. P. Putnam's Sons, New York, N. Y., 1954. Price $2.

PLAGUE, by *R. Pollitzer,* M. D., Formerly of the Division of Epidemiological and Health Statistical Services, World Health Organization. 698 pages; illustrated. World Health Organization, Palais Des Nations, Geneva, Switzerland, 1954. Price $10.

TIME FOR THOUGHT, Poetry and Stories, by *Rufus A. Morison,* M. D. with a Foreword by *Robert Porterfield.* 94 pages. Exposition Press, New York, N. Y., 1954. Price $3.

LEGAL MEDICINE, Pathology and Toxicology, by *Thomas A. Gonzales,* M. D., Chief, Medical Examiner of the City of New York (Retired); Professor of Forensic Medicine, New York University Post-Graduate Medical School; Lecturer on Criminologic Medicine, New York Police Academy; *Morgan Vance,* M. D., Deputy Chief Medical Examiner of the City of New York; Associate Professor of Forensic Medicine, New York University Post-Graduate Medical School; Lecturer in Forensic Medicine, College of Physicians and Surgeons, Columbia University; Lecturer on Criminologic Medicine, New York Police Academy; *Milton Helpern,* M. D., Chief Medical Examiner of the City of New York; Associate Professor of Forensic Medicine, New York University Post-Graduate Medical School; Lecturer in Legal Medicine, Cornell University Medical College; Lecturer on Criminologic Medicine, New York Police Academy; and *Charles J. Umberger,* Ph. D., Toxicologist, Office of the Chief Medical Examiner of the City of New York; Assistant Professor of Forensic Toxicology, New York University Post-Graduate Medical School. Introduction by *Harrison S. Martland.* 2d edition. 1,349 pages; illustrated. Appleton-Century-Crofts, Inc., New York, N. Y., 1954. Price $22.

PROTOZOOLOGY, by *Richard R. Kudo,* D. Sc., Professor of Zoology, The University of Illinois, Urbana, Ill. 4th edition. 968 pages; with 376 illustrations. Charles C Thomas, Publisher, Springfield, Ill., 1954. Price $10.75.

AMERICAN NURSING, History and Interpretation, by *Mary M. Roberts,* R. N. 688 pages; illustrated. The Macmillan Co., New York, N. Y., 1954. Price $6.

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